RAILROAD GAZETTE

FRIDAY, MARCH 20, 1896.

CONTENTS

Contributions.

Railroad Enterprise in China.

SHANGHAI, Feb. 20, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Yours of Dec. 10 to hand, and I can easily understand that you are a good deal mixed as to what is being done in China. The Russians certainly have a military survey party in Manchuria, as a friend of mine saw them in camp, with Cossacks as sentinels, just as if the place belonged to them. Whether it is true they will join the North China Railway Company's line at Kirin or not, not even the highest Chinese official cares to tell, but it seems likely to be the case when their own line is completed, and they feel ready to swallow Manchuria by "peaceful invasion." If they do England will collar the Yangtsze Valley, and thus cut in between the French and Russian forces. Probably Germany has been purchased by Russia and France by a promise of Siam, or some such easily acquired possession. If England wakes up, and America, too, all this little game will be arrested and both are equally interested in keeping China as a trade center for themselves against the un trading but interfering nations like Russia and France. Germany would gladly give up her new friends if she had better ones to rely upon, but the Emperor seems anxious to irritate England into joining the triple alliance in self-defense; but his means are not at all suited to the present English Government. Japan is in doubt and does not know whether to sail in with Russia or trust in the United States and England. The petty squabble over Venezuela has made her still more puzzled as to the true relations of Uncle Sam and John Bull. No wonder: she further cannot understand the sentimental love which America seems to have for Russia. A more damnable government for a free people to respect cannot be found elsewhere, not even in China.

A line is now building to a point some four miles distant from the southwest corner of Peking, as near as it is allowed to go at present. This will be the point of junction of a line going west over Hun Ho and then to Paoting Fu, cross the Yellow River and on to Hankow.

The line will cost some two and a half million taels complete for double-track line, except that rails and ties will now be laid on only one track—85-lb. rails on wooden ties. The locomotives will be moguls and eight-wheel express engines, 19-in. × 24-in. cylinders, 60 in. and 84-in. drivers, respectively, with 16 tons on an axle. The first year's traffic will be about 2,000 passengers and 500 tons of freight daily. The distance from Tientsin is 75 miles, of which two are completed. There will be 5,000 ft. of bridge work, due to terrible floods encountered at most parts of the line; otherwise all is easily done.

All cars will be of American type, built in China, with Janney couplers and Westinghouse air-brakes. The block system or electric staff will be used. Four systems of the latter are now being practically tested upon older parts of the line with excellent results.

The line ought to have free right across the barren "Hunting Park" to the south gate of Peking, with a belt line around the city wall, collecting passengers, etc., at all gates; but this was found to make a demand upon Imperial exclusiveness and the resultant route had to be adopted or none at all.

The educational effect of the line is most important, and the traffic is ample to make a good permanent job the cheapest and best. Colonel Jefferds, our old "tubular car" friend, is wild because a shoddy line of his was not accepted; but with ample traffic and money at 5 per cent. a cheap American prairie track is out of place. He, besides, knows nothing of Eastern rains and floods, which make "cheap" railroads very dear indeed. On the old line, built partly in the United States style, with wooden structures, the cost of maintenance is over double that of the part built up to best standards, and it is fast being made more substantial in consequence. Yet the loss involved has been serious. Good lines can be so cheaply built in China, that any approach to inferior structures is bad engineering.

The Belgians seem gradually getting into power among the railroad enthusiasts swarming in Shanghai, but so far no lines have been sanctioned other than the one to Peking from Tientsin and 40 miles outside the wall en route for Kinchow, which is already two-thirds completed. I hope the line from Shanghai to Nankin will be started before long as surveys have been made by a German Engineer of the Viceroy's. I also hope they will work up from Hankow and meet the Tientsin-Peking line at the Yellow River; but the surveys have not been started. The government will sanction the line provided Chinese merchants will put down 10,000,000 taels as a guarantee they can do it. This is very risky; so far none have appeared. There are scores of agents offering foreign money, as Jefferds, etc., but the Chinese can give no real security, and Russia may interfere if she attempts it. AN ENGINEER.

[If the reader will turn back to the *Railroad Gazette* of Dec. 13 last, page 823, he will find this Tientsin-Peking line predicted in a correction which we ventured to make of a press dispatch which had considerable vogue about that date. If he will turn to the *Railroad Gazette* of April 26, 1895, page 268, he will find a brief but pretty full and accurate account of the railroads of China as they then existed. The letter published above brings the story up to date; but we add a few particulars gathered from a report from Mr. Denby, the Minister of the United States, just made public, and from a late issue of *Engineering* (London).

An imperial decree was issued Dec. 6, 1895, announcing the policy of the empire with regard to railroads. This decree recites that princes and ministers in charge of the Bureau of Military Affairs have memorialized the Emperor, asking that some high official be appointed to take charge of railroad construction. These princes and ministers were ordered to first take into consideration the building of lines in the vicinity of the capital. They selected Hu Chü-Fen, as Mr. Denby transcribed the name, or Hou-Yuen Feng, as it is transcribed by *Engineering*, to investigate the matter and consider the arrangements to be adopted. The result was the recommendation of a line beginning at Tientsin, running along the west bank of the Yun River, by the imperial summer palace, and ending at the Loukou bridge, near Peking. This line would be about 70 miles long, and the cost of material and labor would be 2,400,000 taels ($1,840,000). It is decreed that Hu Chu-Fen shall be entrusted with the execution of this line, and that the proper officers take steps to provide the necessary funds.

As to the principal line projected from the Loukou bridge southward as far as Hankow; this line is long and the cost would be great. If there are in the provinces wealthy merchants who can collect the sum of 10,000,000 taels ($8,000,000), or more, to build this line they are authorized by the decree to form a private company to do so, and to direct the financial and technical affairs. This must be done entirely as a private venture, and the local authorities are to have nothing to do with the enterprise. If it is successful the Emperor promises to those who carry it on honorable distinction.

With regard to the line from Tientsin to Peking, *Engineering* states that the bridge work has been put in the hands of Sir Benjamin Baker. Tenders are out for rails and should be forwarded to Tientsin by May 1. We may add that tenders sent to C. W. Kinder, Esq., Engineer in Chief, North China Railway Co., Tientsin, China, will no doubt be considered. From the letter above it will be observed that these rails are to be 85 lbs. to the yard. *Engineering* states that during August 9,700 tons of 85-lb. rails, rolled to Sandberg's new section, are to be delivered at Tong-ku and that tenders are out for wheels, axles and springs, subject to the inspection of Mr. Sandberg. The specifications for this new work are signed by Mr. Kinder (M. Am. Soc. C. E., and M. Inst. C. E.), and the calls for bids by Mr. Y. T. Lin, Secretary.

Minister Denby says that two Cantonese gentlemen living in Shanghai, members of a syndicate formed to bid for the building of the Peking-Hankow Railroad, state that several of their colleagues have gone to Peking for consultation with reference to this line of railroad, and it is reliably stated that the syndicate has deposited five million taels in cash and securities in various banks as evidence of its ability to carry out the work. The syndicate stands ready to guarantee that the other five millions can be raised from native capitalists within six months after the edict is issued giving necessary authority. Minister Denby further states on the authority of the *North China Herald* that the construction of the Shanghai-Soochow Railroad is to be put in the hands of a cosmopolitan syndicate at the head of which is a Belgian. The Chinese are to borrow the money for construction from this syndicate.—EDITOR RAILROAD GAZETTE.]

Brown's Discipline.

TO THE EDITOR OF THE RAILROAD GAZETTE:

May I ask a question through your columns? I have read with interest all that has been published with regard to Mr. Brown's system of discipline on the Fall Brook Railroad, and the various forms in which the same principle has been adopted on other roads; and the question arises in my mind if the matter is not being carried to excess, in some instances, in the method of keeping records, notably on the Louisville & Nashville, a description of which appeared in your issue of March 6. On that road offenses are compared, with respect to their enormity, to so many days' suspension, and charges made against the offender accordingly. The account further states that a clear record for a certain length of time will be termed a credit, and will offset the debit, so that it will be possible for a man to keep a running account with the company and yet be in good standing and have a clear record all the time.

I once heard of a boy whose father went away from home, and requested him to drive a nail in a post every time he committed a wrong act, at the same time giving him the privilege of withdrawing a nail whenever a good deed was done. The boy had a pretty good time, did about as he pleased, but managed to get all the nails out of the post before his father returned.

The Fall Brook system has some admirable features, and is based on right principles; but whenever it resolves itself into a debit and credit account, as above described, giving the employee to understand that offenses can be paid for, and the account be made clear by that means, it seems to me the object of the reform is not attained.

OBSERVER.

[The officers of the Louisville & Nashville no doubt are fully able to answer for themselves, but we would suggest to "Observer" that (1) the scheme of credits is experimental and can be readily changed if found to work to the disadvantage of either employer or employee; and (2) that the credit side of the account is so very much harder than the debit to fill up that the criticism here offered may be found entirely groundless in actual practice. Fifteen days' suspension means a comparatively mild offense, and when a man has to make a perfect record for a whole year in order to atone for that one offense he must, we should think, lose all enthusiasm he may have had for keeping a debit and credit account with the company. The Louisville & Nashville committee suggested that the one year, two years, etc., might be found to be too long terms, and to need shortening; but if the trouble feared by "Observer" comes up to interfere with good discipline, what is to hinder lengthening the terms? The boy and the nail and the post must be a fable. We suspect that "Observer's" boys are still very young.—EDITOR RAILROAD GAZETTE.]

The Sources of New York's Prosperity.

NEW YORK, March 4, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It pleases me very much to find a substantial agreement between Professor Burr and myself on the principal source of the wealth of New York City. When he emphasizes "the indirect, as well as the direct, influence, past and present, of the water-borne traffic into and out of the port of New York," there is no difference between us, unless it may be a difference in degree of appreciation. But it should not be overlooked that the East River determined the position of New York, which is at the mouth of the Hudson instead of at the head of navigation, and New York was placed in its present position not for the benefit of foreign commerce, but for that of a coastwise and domestic commerce.

For a long time the value of our manufactures was insignificant, even in a population as poor as that of this country, until some time after the close of the war of 1812, but the water-borne commerce of the East River, with that of the 150 miles of navigable water to the north, when extended by the Erie Canal and the navigation of the lakes, gave this city the ability to assemble the raw materials for manufacture and distribute the finished products "to places at which these products find market," at less expense of money or labor than any other producing or consuming point. This attracted the railroads of the country to, or toward, New York, and still further increased our facilities for production and distribution.

It seems plain to me, and I doubt if Mr. Burr will antagonize the view after further consideration, that if we did not pay to hands engaged in manufacturing a sum nearly equal to the value of the exports from this port, the consumption of New York City would not cause us to receive 60 per cent. of the value of the total imports of the whole country.

It is not intended by anything said above to contend that the foreign commerce of the port of New York is not extremely valuable in itself, and helpful both to the domestic commerce of the city and to the manufacturing

interests that center here; but it is contended that, as both the volume and value of either domestic commerce or local manufacturing exceeds both of either the volume or value of foreign commerce, the greater "blessing" does not lie with the foreign commerce, and it should not have precedence in the port of New York.

Although in sympathy with the expressed apprehensions of an extended economic discussion, I would like permission to suggest that if it were not for the cheap distribution to the places at which these products find markets, the wealth of the country would be seriously curtailed; for any cost of transportation must in all cases be taken from the net gains of producers or consumers. As the use of figures in regard to this question seems objectionable, I will merely cite the well-known fact that for some time our farmers, who cater to a trade that implies long transportation, both of their products and of the merchandise received in return have been growing poorer, while our manufacturers, who cater to a nearby trade, have, until lately, been growing richer.

I know these facts have been woven together to form an argument against "our good protectionist friends," but they seem to me to have a very close connection with the question of transportation, which must always have more or less reference to economics.

EDWARD P. NORTH, *M. Am. Soc. C. E.*

The Utah Salt Storm.

NEWARK, March 8, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I was very much interested in reading "The Utah Salt Storm" [issue of Feb. 28], as it explains why we could not get fresh water by digging wells at the lower end of Mud Island in 1868. This island lies between the Weber and Bear river bays, and a cut-off connecting the rivers near their mouths. At the southern end is a hill that rises about 50 ft. above the flat, and it was thought that by going up on the slope, and digging wells, fresh water could be had. This was done and plenty of water found, but it was very salt. The wells were shallow and came to rock, at least 20 ft. above the lake, and it was always a query to me, until now, why the water was salt.

J. R. M.

34-Foot, Drop-Bottom, Coal Cars, L. S. & M. S. Ry.

In the *Railroad Gazette* of Feb. 21 was mentioned the order, recently placed by the Lake Shore & Michigan Southern Railway with the Michigan-Peninsular Car Company, for 500 drop-bottom coal cars, and through the courtesy of Mr. A. M. Waitt, General Master Car Builder, we are enabled to show the design of these cars. The cars are 60,000 lbs. capacity with a length over end sills of 34 ft. The length inside of box is 32 ft. 6 in., width over side sills 8 ft. 6 in., and width inside of box 8 ft.

The special features of the cars, beyond certain peculiarities in the under-frame, are four flush drop doors and the removable ends of the cars. By the use of these doors, dumpable material may be discharged beneath the cars instead of shoveled out.

Fig. 1 is a plan of the car and under-frame, a half elevation and section, and Fig. 2 an end elevation and cross section. All the longitudinal sills are long leaf yellow pine, the side sills being 5 in. × 12 in., framed at each end with double tenons 1⅛ in. × 1¼ in., and lipping under end sills with a lip 4 in. deep, extending to outer face of end sills. The center sills are 4½ in. × 8 in., × 12 in. white oak, gained ½ in. for center and intermediate sills and 4½ in. for the side sills. They are bolted to center and inside intermediate sills with ⅝-in. bolts, and to side and outside intermediate sills with ¾-in. bolts, one bolt to each timber.

The body bolsters are made of wrought iron plates 8 in. wide, the upper ⅝ in. and the lower ⅞ in. thick. The upper plate is let into longitudinal sills ⅜ in., and the ends of the bolster are tenoned into side sills 1 in. deep, passing through cast iron pockets which are bolted on to side sills, and which also serve as truss-rod saddles. The ends of the bolster are bolted to these pockets with two ¾-in. bolts. This is shown in Fig. 2. The center plates are pressed steel, and the side bearings cast iron.

The construction of the draft rigging is shown in Figs. 1 and 2, and is somewhat different from general practice. The draft timbers are 3¾ in. × 8½ in. white oak spaced 12 in. apart and extending from within 3 in. of center of body bolster to 6¾ in. beyond the end sill, gained out to receive deadwoods. They are secured to the floor frame by three ⅞-in. bolts. Each draft timber is connected to an oak draft rod cross timber by a 1-in. rod which is flattened on the end, and fastened to draft timber by two ¾-in. bolts which pass also through stop timbers. The end of this rod goes through the oak cross timber and is held by nuts. These cross timbers are spaced 7 ft. 3 in. on each side of center of car, and are connected by a 1¼ in. rod placed between the center sills. Directly above each draft timber is a 2½-in. × 8-in. reinforcing timber 6 ft. 4 in. long, bolted to center sills. The draft timbers are tied together by a wrought iron strap ⅝ in. × 2¼ in., having the ends lipped up. The draw bar stops are cast iron. Behind the rear stops are 4-in. × 8½-in. white oak stop timbers which extend to the body bolster and are notched out at the back end to receive the 5-in. × 5-in. filling piece. The Gould automatic coupler is used. Two double coil draft springs are used behind each draw bar, the arrangement being like that shown in the "Car Builders' Dictionary," page 188, Figs. 2,059 and 2,060.

The flooring is 2½ in. long leaf yellow pine, and the side planks 3 in. Norway pine. The side planks extend 5 in. beyond the end gates and are keyed together at the first and second stakes from each end of cars. The top edge of upper plank is protected by a 2½-in. × ⅝-in. wrought iron strap. The side stakes are nine in number, the two in line with the needle beams extending flush with the bottom of the beams.

Instead of the ordinary permanent ends, removable doors are used. These are made of four planks of Norway pine 3-in. × 10⅛-in. and stiffened by the insertion of three pieces of ½ in. × 3-in. wrought iron between the planks. Three ½-in. bolts passing through planks, stiffening pieces and top protecting pieces, hold the planks together. The ends are protected by ⅜-in. × 1½-in. wrought iron pieces. Each door has two ⅜-in. × 2-in. wrought iron straps, the lower ends of which are lipped over and riveted to a cast iron filling piece, forming lugs which engage socket plates in the floor. Directly above these straps are wrought iron lifting stirrups. The doors are held in place by 3-in. × 3-in. × ½-in. angles fastened to the side boards outside the doors and by six wrought iron stops on the inside. At the bottom of the door on the outside near each end is a ¾-in. × 2½-in. wrought iron stop which engages another stop on the side planks and prevents the door from being entirely removed when raised. A brace rod of 1-in. round iron extends across the end of car and above this is a 4-in. × 6-in. white oak strut between the top side planks. The bottom of this is grooved to take the brace rod, and the ends are notched out 4-in. to take the side planks.

Fig. 3 is a detail of the drop doors. The drop openings are four in number, 27 in. long and 22⅛ in. wide, and are located between the center sills and outside intermediate sills, 42¼ in. from the center of the car. Angle irons form two sides of the openings, one 2½ in. × 4½ in. × ½

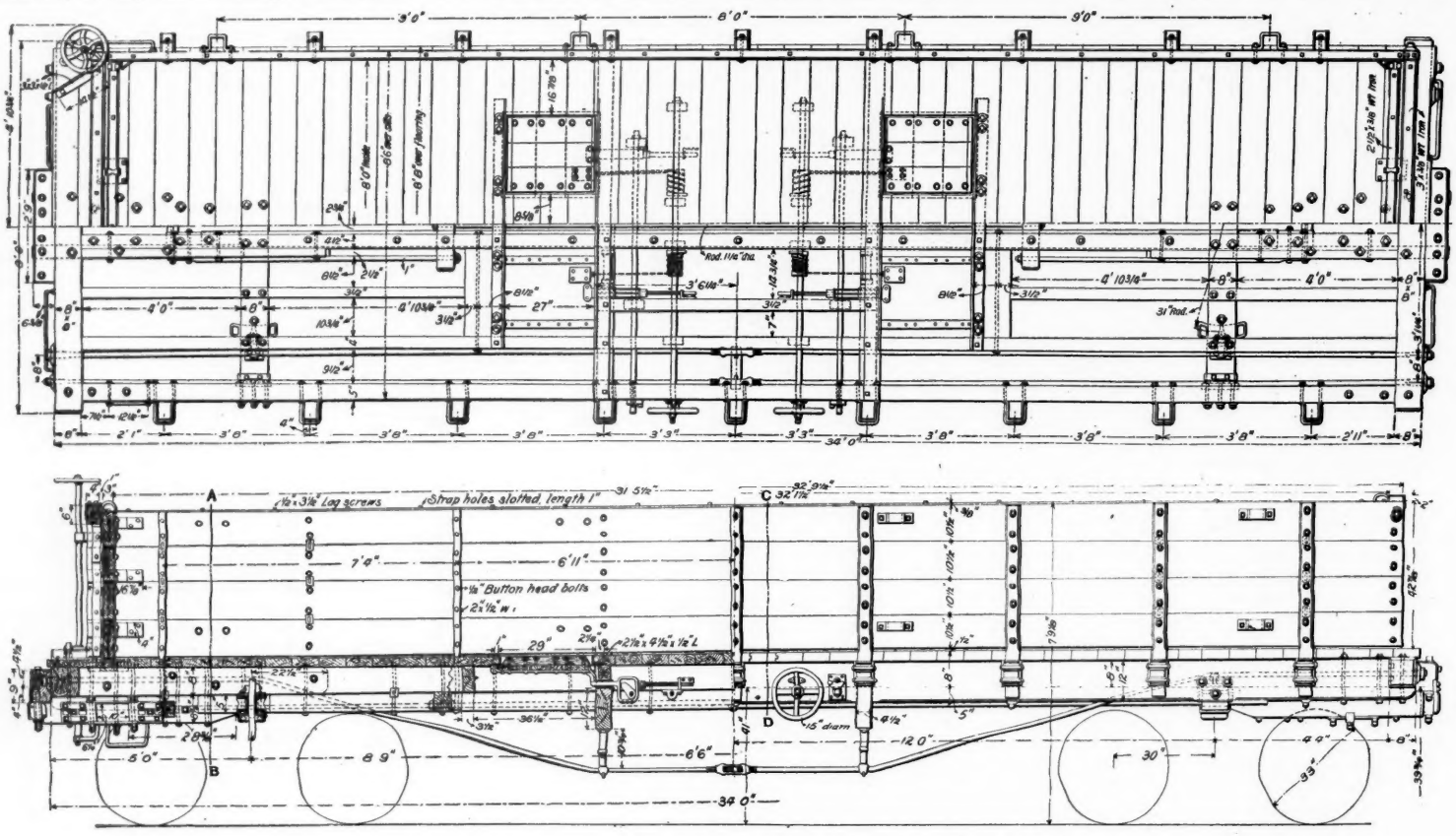


Fig. 1.—34-ft. Drop Bottom Coal Car for the Lake Shore & Michigan Southern Railway.

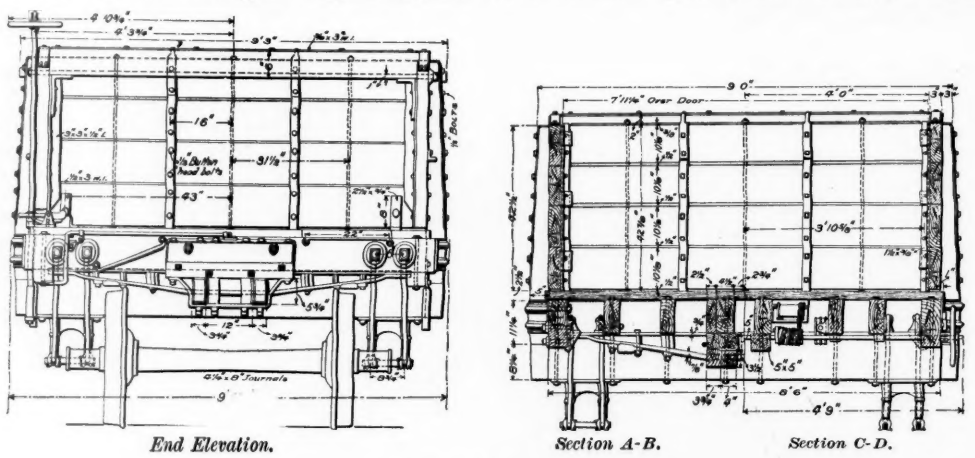


Fig. 2.—L. S. & M. S. Drop Bottom Coal Car.

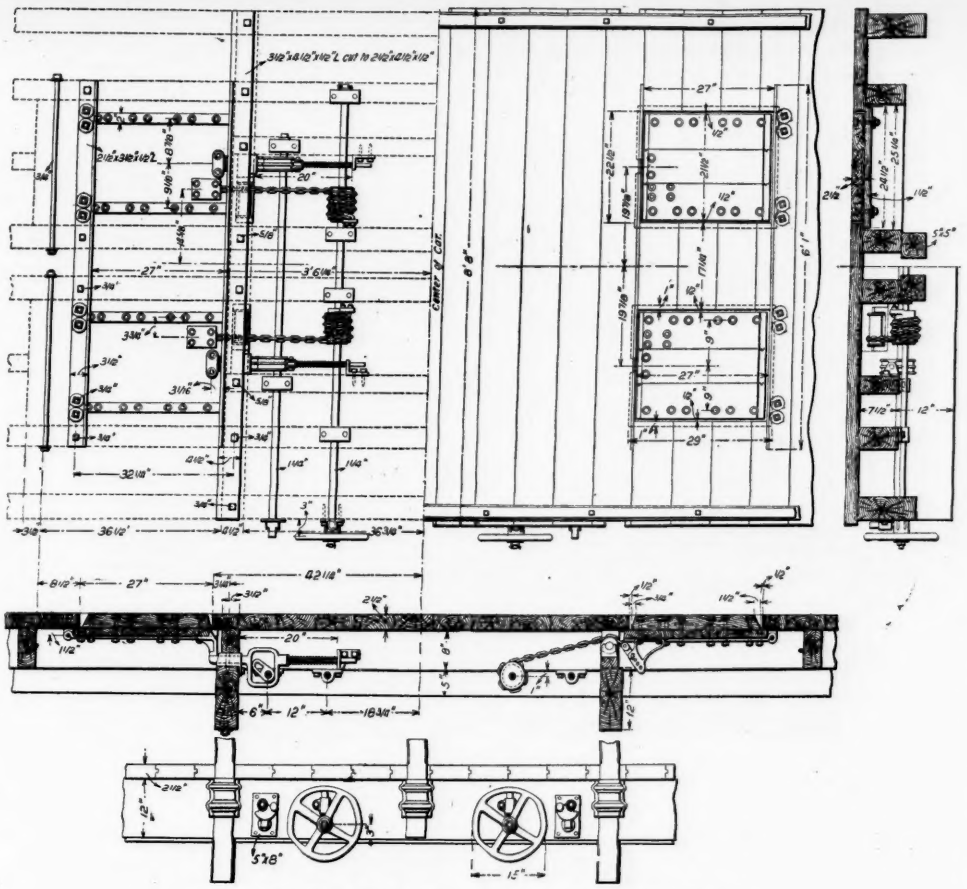


Fig. 3.—Details of Drop Doors—L. S. & M. S. 34-ft. Coal Car.

in., extending the full width of the car, the vertical flange being cut off at the outside intermediate sills, and one 2½ in. × 3½ in. × ½ in., extending from out to out of the same sills. These angles are fastened to the longitudinal sills with ⅝-in. bolts. The 2½-in. × 3½ in. × ½-in. angle forms the support for the door hinges. The doors are made of a double thickness of tongue and groove planks, the lower section lapping over 1 in. each side of the openings. They are each hung by two hinges, the strap portion of which is 2 in. × ⅝-in. wrought iron, extending the full width of door and bolted to it by seven ⅛ in. bolts. The hinge bearings are 2-in. × ¾-in. wrought iron, having ¾-in. shanks, which pass up through the angles and have nuts screwing against cast cup floor washers, which rest on the angle. The ends of the door are beveled as shown.

The door is held up by a malleable iron latch *M* made in two parts, supported on one end by a cast bearing secured to intermediate sill, the opposite end passing through a guide placed on top of the needle beam. A cast-iron bearing is attached to the door. The latch is held closed by a steel coil spring. On the unlocking shaft is a cam which, when the shaft is revolved, engages the latch *M*, compressing the spring, withdrawing the latch and releasing the door. The door is replaced by chain which is wound around a drum on the winding shaft. This chain passes over a small sheave placed on the needle beam.

The cars are equipped with Westinghouse automatic air-brake with cylinder detached from reservoir and triple valve. The air-brake hose is made by the Peerless Manufacturing Company.

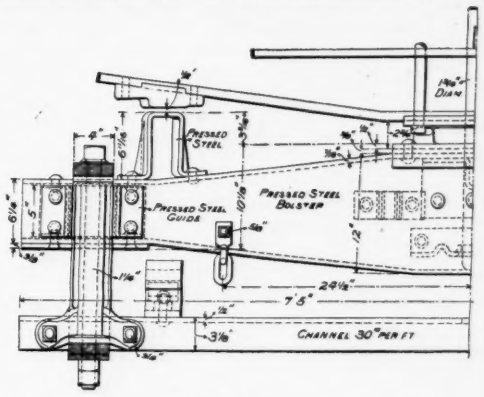
The trucks shown in Fig. 4 are of the rigid diamond pattern with a pressed-steel Schoen bolster and a 12-in. steel channel spring plank. The channel is placed with the flanges down. These are notched out to receive arch bars. The space between the web and bottom arch bar is filled by a casting which is held by a ¾-in. bolt with a counter-sunk head. A hole is drilled in the center of web to allow the king bolt to be driven out. The bolster columns, journal boxes and covers are malleable iron. The Soule dust guard is used. The axles are open-hearth steel made by the Carnegie Steel Company.

Tonnage Rating of Locomotives.

At the February meeting of the North West Railway Club there was a discussion of a paper read by Mr. Vaughan, of the Great Northern Railway, at a previous meeting on the haulage capacity of locomotives:

Mr. VAUGHAN (Gt. Northern): I made a statement in the paper that in some of our tests we had found the resistance per ton to be from four to five pounds, and as one or two people have spoken to me about it, I thought I would bring up the particular test from which I made the statement. In 1892 we tried one of our consolidated engines, running up a hill out of Willmar, where the grade for about twenty-six miles is a 6-10 grade. We started the train over a set of switches; she was partly on a grade when she started, but she was practically with no speed. The engine brought the train over the grade at about four miles an hour, and the total weight of the train with engine was 1,693 tons; the steam pressure on engine was 175 lbs. Taking the full tractive power, allowing nothing for friction on the engine, or back pressure, or anything of that sort, only leaves a little over 5½ lbs. for train resistance and engine resistance. Taking the engine at 9.2 per cent., which I think is very fair, it leaves about 5 lbs. per ton for train resistance; and in this case, I think, we are justly entitled to say that the train resistance did not come much over 5 lbs. per ton. We had the cars all loaded; we thought it was about as heavy a load as the train could haul, and I think that will probably substantiate my statement.

There are so many things which will lower the rating that must be allowed for, that I do not think that it is a good thing to make it too close. We have on our road statements made up for each week, right along throughout the year, giving the amount of tonnage from our terminals, on the freight runs, in the direction of the prevailing business; that is to say, taking between St. Paul and Melrose, if the prevailing business were westbound the tonnage would be shown on the westbound trains only, and then taking the engines that pull the train and the rating for each engine in that list, we can find out what percentage of the haulage capacity has actually been pulled by the engines on that division, and it not only gives you the test of whether the engines are being worked up to their full capacity in the busy season, but it shows whether any repairs are being needed, with the whole train's tonnage at once. In some places we have hauled above our haulage capacity sheets; that has been on very level divisions, where we really haven't made allowance enough for the speed of the train. The allowance we made in that paper was about twenty miles



Truck Bolster.

per hour, and others will exceed that rate where they have a little help up a hill by a down grade a little in front of it. Of course, regular trains must be run whether they are quite up to the rating or not.

Mr. TRACY LYON (C. G. W.): The Great Western Railway has had a system of tonnage rating on all parts of its line in successful operation for about two years, and it is in the light of this experience that I speak.

After a long series of experiments we have divided the road into a certain number of sections, according to ruling grades stations and other conditions, and established by tests the actual hauling capacity in tons of one class, of locomotives at least over each section under favorable conditions. These sections differ in their limits for each direction, and vary in length from six to seventy-five miles. The hauling capacity for one class of locomotives having been determined, the corresponding capacity of the other classes in use is arrived at from a comparison of their traction, figured in the usual way. From the point of view of our experience I can hardly agree with Mr. Vaughan in saying that it is cutting the thing too fine in making a distinction between the different classes of locomotives, if I understand him properly. We expect our locomotives to work within a very small percentage of their rating, and they do it. To facilitate comparisons between the various ratings we use a series of hyperbolic curves, one for each class of locomotives, and based upon their relative traction; one ordinate being the train resistance in pounds per ton, and the other the load in tons between the engine and caboose. These curves are also used in determining the ratings for inferior conditions of rail and weather. Instead of making a horizontal reduction of a certain percentage for such conditions as indicated in Mr. Vaughan's paper, we add to the train resistance, corresponding to a certain rating, two

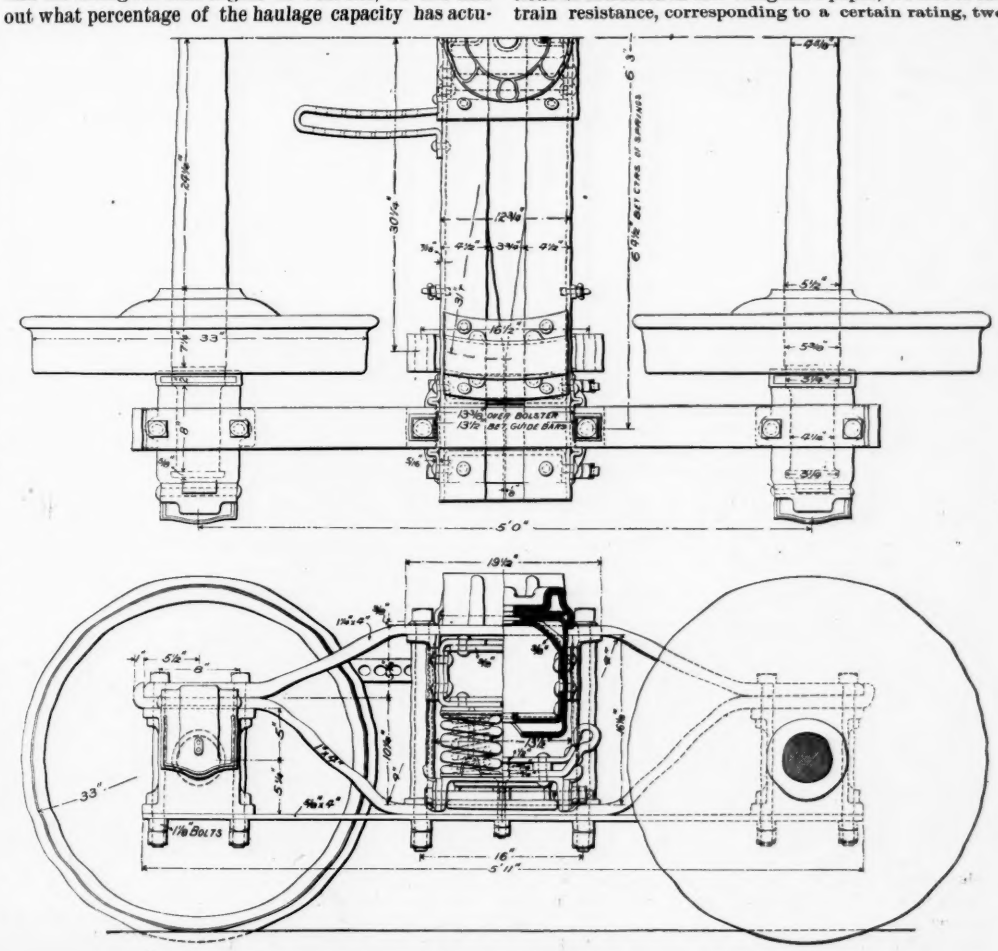


Fig. 4.—Details of Truck for Drop Bottom Coal Car—L. S. & M. S. Ry.

lbs. per ton to obtain what we call second rating—that is to say, for an inferior condition of rail and weather; and 4⅘ lbs. to arrive at the third or still inferior rating, representing the most unfavorable conditions ordinarily met with. By obtaining these ratings in this way the decrease in the rating is proportionately less as the load decreases, and this would seem to be a better principle than that of making a horizontal decrease of a certain percentage, which would make a proportionately greater reduction in a smaller train than a larger one.

We also make a reduction of from 2 to 10 per cent. in the rating for empty cars, these figures being based on the assumption that the wheel resistance per ton of an empty car is one-third greater than of a loaded car, or as 8 lbs. is to 6 lbs.

The principle advanced in Mr. Vaughan's paper, of increasing the weight of an empty car to allow for empties in making up the tonnage of a train, is, I think, a sound one, but it results in obtaining a tonnage which is not in accordance with the actual facts, and if the ton miles so obtained are to be used for any other purpose, as we use them, it would be very inconvenient, and we, therefore, did not, although we considered such a method, adopt it, but preferred the horizontal decrease, which we find works very well.

Our maximum reduction in rating for empties is, as I say, 10 per cent., that is, with a train of all empties.

I referred to the use of the ton mileage. We base our coal consumption upon it, and also find it valuable as a basis in making comparative statements of repairs and other accounts. Probably you have all read Mr. McConnell's paper in which he advances that method very strongly.

Mr. Vaughan has referred to-night to making a weekly statement of how near the loads hauled have approached what the tonnage sheet calls for. That is a very important point, as when a consistent tonnage rating has been established, only the first step has been taken. The next thing is to determine what is being done and how near the standard is being approached. We have a daily statement showing the tonnage of every train, upon which is shown the actual cost of the wages of engine and trainmen per 100 ton miles in the direction of greatest traffic, as compared with what these wages would have been per 100 ton miles if the full rating had been hauled. A separate statement is made for each division.

Our despatchers are held very rigidly to account in this respect, as in their hands lies the decision as to what rating shall be used. The yardmasters have standing orders that they shall load all trains to first rating in the absence of other instructions. I have heard it stated that the handling of trains by tons instead of by loaded cars was a very desirable thing, but that it was impracticable on account of the difficulty in carrying out such a plan. As I said, we have had such a plan in successful operation for two years; it has been proved to be neither expensive nor difficult to carry out, and the results have been most gratifying.

The weight of each carload, both car and contents, is in the first place inserted in the way-bill by the agent. Fractions are not used, less than 1,000 lbs. being dropped, and over 1,000 counted as 1 ton. This information is shown on the switch list used by the yard men in making up a train, empties being given on arbitrary weight depending on the class of car. The weight of the cars and their contents, having been inserted on the conductor's report, is certified to by the agent, and we find no difficulty in checking this, so that we are very sure of the results. This information is sent to the despatcher at once so that he may know what the rating is, and at all stations where cars are set out or picked up the change in tonnage is reported to him. In order to be informed as to what the rating should be, the despatcher receives a telegraphic report of the weather and condition of rail from all stations twice a day.

We have recently been making some tests by taking a train, usually of 1,000 tons, and sending it over one or two divisions with a helping engine behind, and by use of a speed recorder and very careful observations we obtain the information which will enable us to increase the rating, or to know what changes in grades or other physical conditions are necessary to reach the desired results. Of course we may stall a number of times; we expect to stall, but by so doing we know just how much we can do.

Mr. JAS. SLAVIN (C. G. W.): I think that Mr. Vaughan in his very excellent paper, and Mr. Lyon, have both pretty well covered the ground. I might explain my method of making tests. We had no dynomometer. We had to go at it in a very crude way, and usually commenced by getting the cut-off of the engine, weighing the train carefully, and when on the road took the maximum speed at the foot of all grades, also took the speed at frequent intervals on the hill, and knowing the rate at which the speed had decreased, at the same time knowing the boiler pressure and points of cut-off, at the end of the trip we made a report of the performance of the engine on the different grades on the division, usually tested from one to three classes of engines on each section of the road. When we put our tonnage rating into effect we tested the curvature for about two months and a half in the winter time when we have got all kinds of weather.

On our heaviest grades, where our tonnage is 590 tons for one of our mogul engines, the reduction of the second rating would be about 9½ per cent., while the same engine on other portions of the road often was able to haul 1,000 tons under favorable conditions. The reduction for the second rating would be about 14 per cent. Our greatest difficulty in rating is to establish the proper rating or allowance for empty cars in cold weather. We find that the conditions calling for a reduction from the first to second ratings, due to fall in temperature or wind, are very different from a wet and slippery rail. One increases the train resistance while the other merely puts the other at a disadvantage, and, if anything, decreases the frictional resistance. I might say that in our tests of a thousand tons we have been surprised in some instances in pulling trains over grades that we didn't expect to. In some cases we have pulled a thousand tons over one per cent. grades, for half or three-quarters mile, at the same time going over it. In one instance we pulled up a grade of five-tenths of one per cent., and then on to seven-tenths of one per cent., and then on to a one per cent. Of course, the one per cent. grade in that instance was short. In one of the tests of that kind we took a standing start from about a mile and a half from the one per cent grade on a level track for a short distance, and we had about 3,500 ft. of seven-tenths of one per cent., then a level track, and then on a one per cent. grade, and we took the train at the rate of about three miles per hour over the top of the hill.

Mr. J. O. PATTEE (G. N.): What size engine did you use?

Mr. JAS. SLAVIN (C. G. W.): An 18 × 24 mogul, and 48-in. wheel center. The tire at that time was 2½ in. thick, carrying 150 lbs. boiler pressure.

Mr. A. E. WILLIAMS (Soo Line): There are three ways in which to determine the hauling capacity of a locomotive—

First: By the simple rule mentioned in Mr. Vaughan's paper, where the tractive force equals the square of the diameter of cylinders, multiplied by the stroke, multiplied by the mean effective pressure and divided by the diameter of driving wheels.

Second: By the use of a dynamometer car.

Third: By actual test with an engine in good condition worked to its full capacity, taking the actual weight of train hauled over each division and grade.

Mr. Vaughan has expressed an interest in knowing how closely the results obtained on the Great Northern approximate the truth. Surely all of us would be interested in the same problem.

On May 1, 1895, the Soo Line commenced rating its locomotives on the tonnage basis. The rating (in tons) for each class of locomotive, between each station on the several divisions, was based on the actual weight of train that an engine in good condition, worked to its full capacity, with all conditions favorable, had previously hauled. We have what is known as "First," "Second" and "Third" rating, all in tons, to suit the different conditions of engines, weather, rail, etc.

The coal consumed by locomotives for eight months in 1895, May to December inclusive, while rating engines on the tonnage basis, as compared with the same months in 1894, shows a net saving of $16,807.28, or a trifle over $2,100 per month. The cost per mile for hauling freight cars in 1894 was one and eighteen one-hundredths of a cent, and in 1895 it was one cent—a difference of eighteen one-hundredths of a cent. This difference, multiplied by the freight car mileage for 1895, namely, 36,543,908 miles, making a net saving of $65,779.03. Our increase in loaded cars hauled in 1895, as compared with 1894, was 1 44. The repairs of locomotives during the eight months in 1895 (in which they were operated on the tonnage system) increased to some extent, but in shopping locomotives for repairs we do not consider so much the mileage that an engine has made as we do the tons of freight it has moved. When a locomotive shows an indication of weakness—leaks in firebox or tubes—the repair shop is the proper place for it, instead of on the road hauling trains with reduced tonnage, and, in consequence, consuming additional fuel, the cost of which in a few trips would pay for renewing tubes and other light repairs.

A great deal has been said by master mechanics, foremen and locomotive engineers about the disastrous results produced on fireboxes and tubes by overloading locomotives. I believe this is a "bugbear," with very little foundation in fact. There is a happy medium between running locomotives over the road with trains less than their maximum tonnage and "overloading," and, as Mr. J. H McConnell in his very valuable paper on "Locomotive Service" says, "An increase of one car containing 20 tons of freight in each train will increase the earnings of a locomotive in one year $7,200, and the only additional expense would be 95 tons of coal." With these facts before us, it would appear to me that officials at the head of locomotive departments should aim to shop engines as often as it may be necessary in order to obtain the most economical results.

I believe the average cost per mile for operating locomotives is between 18 and 20 cents. Now, for example, let us suppose it costs 25 cents per mile to operate locomotives, and the cost per mile for moving loaded freight cars is ninety one-hundredths of a cent. Is there any question but that the results obtained would more than justify the additional cost of repairs?

The "Total Cost per Mile for Operating Locomotives," and "Miles Run to a Ton of Coal," as shown on the average performance sheets of different railways, are misleading. In fact, the average performance sheets furnish no reliable data for comparison as to the actual service or work of locomotives. If all performance sheets would show the cost to move a loaded car one mile, we would then have reliable data for comparison.

The Northwestern system of hauling cars is entirely on the tonnage basis, and with very satisfactory results. On the Minnesota and Dakota divisions that I am connected with we commenced early last summer, and we reached our conclusions in regard to the size of the trains by practical methods. We simply organized by taking a representative engine of the largest class that we use on those divisions and weighed a train, took along a second locomotive, had a representative in the caboose to look after weights and changes we found necessary to make as we proceeded, and another on the engine to keep a record of the boiler pressure, speed, cut-off, etc. We started in to do up the division from one end to the other and back again. We worked under very favorable conditions—the weather was fine during the whole period, and we always undertook to start with a larger train on the hill than the engine was capable of pulling. We would stall, then set out a certain amount and go on again, until we would overcome the hill. We continued to do that, and in that way determined what one of our best engines could haul.

We took one engine of a lighter class on any particular hill, treated her in the same manner and determined what she could pull over the remainder of the division by simple percentage, or proportionately to the larger engine. We have found occasion since, in some instances, to increase the road over certain hills and over certain portions of the divisions. In other instances, only one or two, we have found it necessary to reduce—the rating being a little too high. We only have one reduction that we make and that is 10 per cent., in case it is unfavorable weather, and leave the balance to the train men, requiring them to notify the despatcher by wire the circumstances under which cars are set out to reduce the train. Of course there are cases where we find engines that are not doing the work that they are expected to do. We figure out their capacity theoretically, and compare that with practical work, and in that manner we have had very satisfactory results—not only more satisfactory, but the economical results have been better. We are hauling more tons of freight, and we find other parties interested are better satisfied with the operating officials and the enginemen. They were opposed to pulling cars on that basis to commence with, but as they become accustomed to it they fell in with it very gracefully, and now wouldn't want to pull cars on any other basis.

PRESIDENT BROOKE (Great Northern): I should like to have heard a few more figures as to the economical results obtained under the new system as compared with the old. On our line we have only had the tonnage system in use for about six months, and fortunately for the road, but unfortunately for the sake of comparison, the nature of our work for the last six months of 1895, as compared with the last six months of 1894, were such that the loads were heavy both ways, thereby reducing our percentage of empty car mileage lower than it had ever been before. Hence any cost comparison between the two periods will not be under exactly the same circumstances. After making due allowance, however, we consider that we have accomplished the same amount of work at about a 6-per cent. reduction over the cost for same period in previous year. I received the other day a letter from our Master of Transportation, Mr. E. L. Brown, bearing on this subject, which I will read:

"Referring to our conversation of recent date in relation to the saving to this company in train mileage, by operating under the tonnage system, I beg to advise that, while I have not the exact figures showing the actual saving in train mileage at hand, previous to adopting the tonnage system we were handling 40 loads between St. Paul and Hinckley, and 35 loads between Rutledge and Duluth. Under the tonnage system we have increased this number to from 43 to 45 loads south of Hinckley, and an average of 40 loads between Rutledge and Duluth.

"Our experience has shown that our engines can handle from 85 to 87 per cent. of the tonnage of a loaded train in empty cars."

When we commenced experimenting with the tonnage system, we first instructed the firemen to keep record of the number of scoops of coal used in going over specified grades, and, finally, to keep a record of the number of scoops used between stations over the line. We then obtained what we called an average weight of coal for each scoopful, from which we obtained the pounds of coal used between various points along the line. We also found this method of keeping coal record did not vary to exceed 200 pounds from the actual amount of coal consumed by engines during the trips, and was hence considered close enough for comparisons. The amount of coal used on the different grades was then carefully tabulated with the train weight and time consumed in going over the grades with 40 loaded car trains, from which our first rough deductions were made. The first point to show up glaringly was that the tonnage for a 40-car train varied from 675 tons to over 1,400 tons. The low tonnage train going over in short time with small coal consumption of coal, while the heaviest tonnage took an undue length of time with greatly increased consumption of coal. The engineer of the heavy train being usually met with a demand for explanation as to the time consumed on arriving at terminal, and any explanation he might make was met with the answer that so and so, with a 40-car train, went over in such and such a time, and we shall expect you to do so also.

It was then decided that a 1,200 ton train would be used as the most economical limit with reference to coal consumption, wear and tear on engine, and time element. After-experiments, however, have shown that this tonnage could be increased to 1,25

tons without detriment, and at the present time it is our standard in moderate weather and conditions. Under the tonnage system we hear no more in the round-house conventions about a "fly run with a light-pulling train," or a "hard-pulling train, and could get nowhere, and layed out everybody."

To show the cost of coal per loaded freight-car mile on this road, for the last six months respectively of 1894 and 1895, I will read the following table:

MONTH.	Pounds of Coal Per Car Mile. 1894.	1895.	Cost of Coal Per Car Mile. 1894.	1895.
July	3.04	2.68	0.50c.	0.40c.
August	2.95	2.99	0.49c.	0.45c.
September	3.36	2.90	0.55c.	0.41c.
October	3.33	3.68	0.55c.	0.52c.
November	3.99	4.20	0.66c.	0.63c.
December	3.89	4.07	0.61c.	0.61c.

Our experience so far has thoroughly convinced us that the "tonnage train" is far preferable to the "loaded-car train," both as to economical and general results.

Mr. J. J. ELLIS (C., St. P., M. & O.): In looking over the reports sent in as actual practice in hauling tonnage over the tunnel and other hills, there is quite a difference in the resistance of trains; engines going east over the tunnel hill with the same class of trains, in some cases actually stall, while heavier ones go over.

[Mr. Ellis gave a number of examples showing where an engine had been obliged to "double" over a hill with a train from 7 tons to 76 tons lighter than one that had taken over. The grades quoted were 35 ft., 52.8 ft. and 60.1 ft. per mile, with curves.]

The above figures go to show that all trains do not haul alike; these are some of the noticeable incidents on this division; this place is where all engines have to test their boiler capacity for 2½ miles.

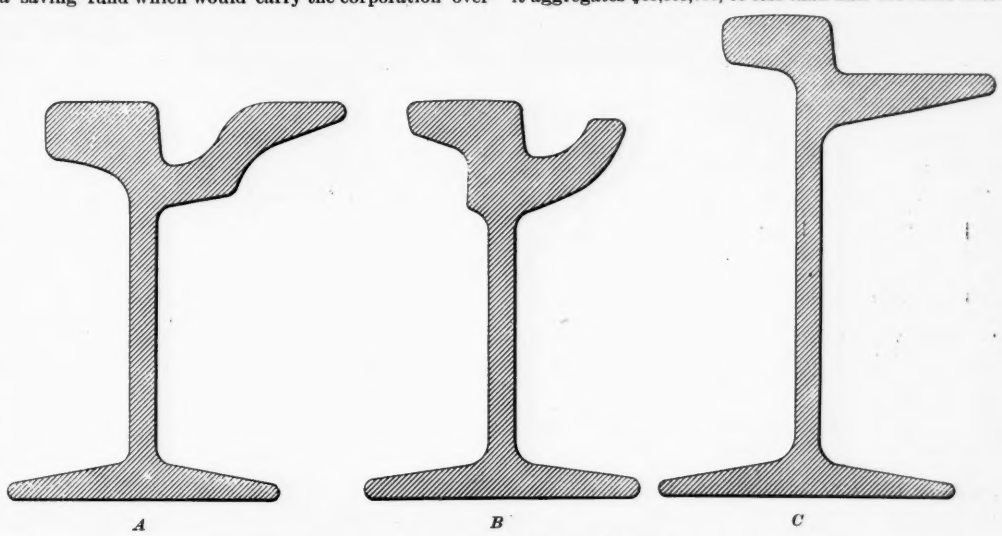
These are all evidences that the maximum cannot be anticipated at all times; differences can be found in loads not distributed to the best advantage; that is, if the loads are all on the back end of the train and empties in front the train gives greater resistance passing around curves; the heaviest end of the train pulls the flanges of the car wheels harder against the inner rail when trains are loaded in this manner; where our trucks have mismated wheels and also trucks out of square, more flange friction is the case than would be if wheels and trucks were properly tracked; poorly oiled journals, also inferior journal bearings increase the friction.

Mr. Vaughan's paper states that 120 ft. is the greatest height of a hill that you should calculate to take a run for. Our tunnel hill is 154 ft., and if they did not take a run for it they would never be able to take their trains over; they usually get their trains running 25 to 30 miles per hour at the foot of the hill—also Mineopa Hill; the distance would be nearer 175 ft. rise as the limit.

Standard Rail for New York Street Railroads.

A new form of girder rail has been adopted by the Department of Public Works for use on the street railroad lines of New York City. This rail is shown in section at *A* in the accompanying engravings. It was submitted to the Department of Public Works for acceptance by the Metropolitan Traction Company, and after some modifications made at the direction of the Commissioner of Public Works it was accepted in the form shown herewith.

The rail now laid on Broadway in the tracks of the Metropolitan Traction Company is shown at *B*, and as will be seen is a half-grooved rail. At *C* is shown the Hewitt rail, designed by Ex-Mayor Hewitt. The reason for adopting the new form of rail is in the difficulty which is experienced by vehicles in leaving the track. When wagons or carriages with narrow tires have been running in the track line, and wish to turn out, the forms of rails heretofore used make such turning out very difficult, inasmuch as a severe twist is given to the tire or wheel. In the new form the upper flange is so designed that it will assist a wheel in leaving the track. As the wheel rolls forward the flange acts as an inclined plane and raises the wheel easily and smoothly from the slot. We are indebted to Mr. Edward P. North, Water Purveyor, for the drawings which accompany this article.



A *B* *C*

Rail Sections—New York Street Railroads.

The President's Address at the Annual Meeting of the Pennsylvania Stockholders.

The addresses which President Roberts makes at each year's meeting of the stockholders of the Pennsylvania, reviewing the more important facts in the present history of the company, are always interesting epitomes of the changes of the year. The address which he made last week was particularly happy and illuminating. We regret that we have space for only a few brief extracts.

It was, of course, a pleasant task to report net earnings of over twenty million dollars (an increase of eight per cent. over 1894), and an increase in tonnage of 21 per cent. Passing from figures of earnings and traffic, Mr. Roberts spoke of the company's car trusts, through which nearly 60,000 cars have been bought. "The car trust system was instituted when the credit of the company was not quite as good as it is to-day and when money commanded a higher rate of interest than it does now, but the system has been dropped for the present, and the necessity will probably not occur for resorting to that method hereafter. The 60,000 cars in the trust have involved an outlay of somewhere in the neighborhood of $31,000,000, all of which has been paid off now, but about five and a half millions, and when that sum is discharged the remainder of those cars, amounting to 27,500, will come into the direct ownership of the company or its allied lines."

The lines west of Pittsburgh showed an increase of over $2,000,000 in net profit. Pointing out the improvement of earnings on these lines, particularly on the Northwestern lines, which profited by the improved conditions in the coal and iron industries, Mr. Roberts discussed certain principles of railroad financing of general interest. He said: "These properties are all in excellent condition, and show the wisdom of the policy pursued by this company of paying for what you own instead of leasing and paying somebody else for what they continue to own. The policy of leasing railroads obtained with this company in earlier days to some extent, owing to the inability to secure capital, but it has been departed from almost wholly in the administration of your affairs, and we believe with good results. The increased credit of your company has enabled you to obtain your capital at the lowest possible cost. The Southwestern system is now wholly controlled through the ownership of its shares and bonds. The Northwest system is still controlled largely under the lease of the Fort Wayne Railroad. This company will stand out distinct from the general corporations of this country in the fact of the policy pursued now of owning whatever it thinks it is wise for it to control. In the case of the Philadelphia, Wilmington & Baltimore, instead of leasing it at what the shareholders then conceived to be its value of 8 per cent. per annum, you bought it outright, and we have been able to get your money at from 4 to 5 per cent., probably lower. The sinking funds of the Western lines have all been kept up, and especially on the Fort Wayne Road. They will, when the first and second mortgages become due, bring a large income of value to your property, as the sinking fund provides that after the settlement of the $10,000,000 mortgage it will not permit the placing of any other bonds upon it."

Speaking of the trust fund of 1878, which now holds nearly 10 million dollars of securities, he described it as a saving fund which would carry the corporation over many rough places. It has already purchased one half of the $1,500,000 of the bonds of the American Steamship Co. issued on the steamships in the effort to establish a line from Philadelphia, which was wholly unsuccessful. The bonds which are now coming due carry the guarantee of the railroad both as to principal and interest, without any property to provide for their payment when they fall due.

In conclusion Mr. Roberts discussed the conditions so long confronting the railroads of the country, and which led to the formation of the Joint Traffic Association. He did not believe that it was illegal. Some such association was necessary to carry out the Interstate Commerce Law. No railroad belonging to it was receiving to-day any higher compensation for freight carried than the tariffs of the railroads provided for before the agreement.

Texas Railroad Commissioners' Report.

The Railroad Commissioners of Texas, John H. Regan, L. J. Storey and N. A. Stedman, have issued the fourth annual report of the Commission, which is for the calender year 1895, with statistics to June 30. The length of railroad in Texas is 9,291 miles, a net increase over the preceding year of 137 miles. The report consists of 30 chapters, each of which is a careful summary of the work of the Board or of existing conditions, concerning some particular topic. Eleven commodity tariffs for freight have been made during the year. The Commissioners repel the charge that since the Federal Court decided that the rates first made by the Commission were too low, they have unduly favored the railroads by making high rates. They have made a few slight advances, but most of the changes have been reductions, and on cotton they estimate that the reduction of 5 cents, equal to 25 cents a bale, ordered by the Commission, has saved the people of the state $825,000. Some reductions have been necessary in order to encourage Texas manufacturers, and it is held that this has promoted general prosperity while increasing the earnings of the railroads. The Commissioners are frequently embarrassed by low interstate rates, tariffs within Texas having to be made to compete with those to and from points outside. The action of the Texas railroads in taking cotton northward to be sent to Liverpool via New York or Boston is complained of, and the hope is expressed that the railroads will be more friendly to Texas, and make rates to take the cotton to Texas gulf ports.

While the Commission understands its duty to the people it will not hesitate, if necessary, to increase rates to enable the railroads to earn a fair revenue on their capital. The rivalries of Texas cities are mentioned and the Commission will be absolutely impartial as between them. The Galveston-Houston differential and the cotton compress regulations, both of which are familiar to readers of the *Railroad Gazette*, are touched upon.

The Commission needs more clerical force, being unable to examine and file tariffs as fast as they come in. Over 5,000 tariffs have already been received. There is scarcely a road in Texas 50 miles long but has more persons in its general office than have the Commissioners. The Board also needs a greater allowance for traveling expenses, being often unable to make needed inspections or investigations unless the Commissioners pay their hotel bills out of their own pockets.

The Commission recommends that express companies be made subject to regulation. The law forbidding consolidation of parallel lines is discussed and a list of 14 roads, all controlled by the Southern Pacific, is given. The Commissioners hear that the state of California is "in the grasp and under the control of the railroad corporations," and they warn the people of Texas to be on their guard.

Under the act of 1893, requiring the Commissioners to ascertain the value of every road in the State, 98 per cent. of the roads (47 companies) have been examined and their value is set at $140,376,122, equal to $15,844 a mile. The capitalization of 42 of these 47 roads is $367,677,044, or $227,300,922 more than the Commission believes to be the value of the 47 roads. About 500 miles is exempt from taxation, but the assessors' valuation of the rest of it aggregates $68,560,730, or less than half the value fixed by the Commission. Notes have been made of the physical condition of the roads. Improvement is noticed everywhere, but much of the track is still unsatisfactory and some is safe only at exceedingly moderate speeds. Particulars are given of the approvals given by the Board for the issue of bonds by railroad companies. These aggregate $8,078,160, which is about four times the amount of capital stock subscribed and nearly 10 times the amount of capital stock paid in.

The report recommends a change in the law, so that the Commissioners can order changes in freight rates on shorter notice, so as to more nearly correspond with the practice of the Interstate Commerce Commission under the federal law.

The statistics reported by the roads are tabulated at length, and in the reports of individual roads, filling 100 pages, the matter tabulated is omitted so as to avoid repetition. Every road has sent in a report, and most of them more promptly than formerly.

Military Railroads During the War of the Rebellion.

We have secured from Col. A. M. Tucker, late General Manager, now General Agent of the Erie lines at Cleveland, Ohio, a most interesting account of some of the operations conducted upon the military railroads of the Departments of the Cumberland, the Ohio and the Tennessee, during the civil war. Colonel Tucker was Purchasing and Disbursing Quartermaster of the roads in these departments in 1863 and 1864, and his authority was derived from the Secretary of War in pursuance of a special order dated Louisville, Ky., Oct. 19, 1863, at which date Hon Edwin M. Stanton, Secretary of War; Col. Thos A. Scott, Aide-de-Camp and ex-Assistant Secretary of War; and Mr. Frank Thomson, his Secretary (now First Vice-President of the Pennsylvania Railroad system), were making their headquarters at the Galt House, Louisville.

Colonel Tucker's duties included the supplying of railroad equipment, which was to be secured either by ordinary purchase or by confiscation if necessary. Some of the

prices paid for locomotives and cars are startling, even though the 3 per cent. Government tax which existed then be subtracted. Most of the locomotives were 16, 17 or 18 × 24 in. cylinders, and we find one on the list purchased for $8,000 which was condemned on its arrival at Louisville and never used.

The list contains many old and well-known names, among which are the following: M. W. Baldwin & Co., Richard Norris & Son, Rogers Locomotive & Machine Works, Hinkley, Williams & Co., Danforth, Cooke & Co., Taunton Locomotive Works, William Mason, Rochester Locomotive Work, Schenectady Locomotive Works and New Jersey Locomotive Works. Of 32 locomotives gathered from different builders and railroads the average price was about $15,300—while for 24 ordered direct from the builders an average of $16,102 was paid. One from the Michigan Southern & Northern Indiana Railroad cost $17,500, but the highest price, $17,902, seems to have been paid for a Baldwin, and the lowest, $8,000, for the engine named above.

The price of freight cars was in proportion to that of the locomotives, for it ranged from $700 to more than $900 for box cars, and from $650 to $800 for flat cars.

The gage of all the equipment on the Louisville & Frankfort and Lexington & Frankfort Railroad was changed from 4½ to 5 ft., and it is interesting to note that this item alone in the month of December cost $11,015.58; for locomotives it cost $815 each, and for freight cars from $117 to $163 apiece.

Hand cars, too, were profitable in those days, for 12 of them brought $103 apiece.

Experiments with Locomotive Exhaust Pipes and Smokestacks.*

In the years from 1892 to 1894 experiments were made at Hanover, Germany, on stationary apparatus, constructed for the purpose, and on moving locomotives, to ascertain the usefulness of the various types of locomotive smokestacks and exhaust pipes.

The stationary apparatus was constructed as shown in Fig. 13. It comprises an air chamber over a steam chest with a common bottom, into which the exhaust pipe is tightly fitted; four adjustable holes in the sides of the air chamber; a hole in its cover of 17¾ in. diameter, over which the stacks are placed; variation of the distance of the stack from the exhaust nozzle being secured by the insertion of rings 1 9/16 in. high.

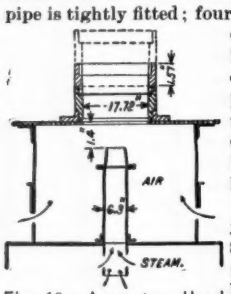


Fig. 13.—Apparatus Used in Experiments.

The four air holes were adjusted to have a joint area of 8.0 sq. in., which was determined by experiment on a locomotive. To determine this one slide valve of the engine was removed, and the other one fastened so as to close the ports. The mercury manometer of the apparatus was then connected to the empty steam chest, and so much steam admitted by the regulator, that with such a thickness of combustible as usually occurs in rapid runs the water manometer connected to the smokebox indicated a vacuum of 3 1/16 in. water column. The steam pressure measured on the mercury manometer corresponding to these values was taken down, and the experiment was repeated until a reliable average value had been obtained. Thereupon, employing a corresponding exhaust pipe and smokestack, steam was admitted into the apparatus, until the mercury manometer indicated the same average, when the four air holes were adjusted to produce a vacuum of 3 1/16 in. water column.

Thus the apparatus acted with the use of cold air the same as an exhaust pipe and smokestack with hot gases. It was possible to retain the same adjustment for experiments with other exhaust pipes and stacks, and so compare the various stacks with each other.

The experiments were conducted using five exhaust pipes of the usual type having upper diameters of 3 1/16 in. 4 1/16 in., 4¾ in., 5⅛ in. and 5½ in., five cylindrical smokestacks of 13¾ in., 14¾ in., 15¾ in., 16¾ in. and 17¾ in. diameter with spreading base, five double-tapered smokestacks of a least diameter of 11¾ in., 12¾ in., 13¾ in., 14¾ in. and 15¾ in. tapering 1:12 and 1:6 toward the top, and three funnel-shaped smokestacks without base, Fig. 14 shows the shape and dimensions usually employed for locomotive smokestacks.

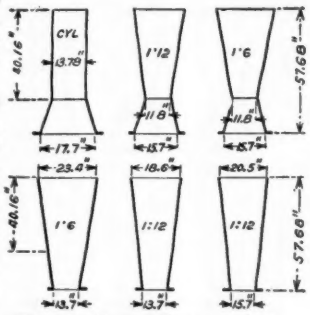


Fig. 14.—Various Types of Stack.

More than 30,000 readings were taken, the experiments being always repeated several times under the same conditions. The results coincided to such a degree that the observed vacua never varied more than from 1/32 to 3/32 in. In each experiment a pressure above the atmosphere of 3 1/16 in. on the mercury manometer was employed, which corresponds to a passenger locomotive running at from 34⅜ to 37½ miles an hour.

Each stack was experimented upon in full length and shortened three times, every length being used in combination with the five differing exhaust pipes. Thus 320 combinations were made, each tried for 10 different nozzle distances, in order to obtain 10 plot-points, the latter being determined from an average of about six readings for each. The principal results from the exhaust pipe of 4¾ in. diameter are shown in Figs. 1 to 12, which will suffice to illustrate the most characteristic features.

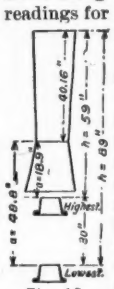


Fig. 15.

The curves, Fig. 15, are plotted with distances a as abscisses. a is the distance from the top of the exhaust nozzle to the narrowest section of the smokestack. The ordinates are the corresponding vacua in millimeter of water-column under an exhaust pressure of 3 1/16 in. mercury column. The ratio of vacuum to exhaust pressure, which might be called the "efficiency" of the smokestack, is thus shown by the curves one hundred times enlarged.

EXPERIMENTS WITH FULL-LENGTH SMOKESTACKS.

The vacuum in the three smokestacks of the taper *o* 1:12 and 1:6, is represented by the curves Figs. 1, 2, 3, for the five diameters shown. With an increasing value of a the vacuum rises to a maximum and then decreases again, and as the comparison in Fig. 4 shows, is the more dependent on a and reaches its highest point if the greater value of a is combined with the greater taper. This distance a also becomes greater the wider the smokestacks are, consequently there is for each smokestack a certain value of a, for which the steam jet produces the best effect. If a is made smaller the steam jet does not fill the stack sufficiently; if it is made greater it fills it too full. The vacuum resulting from 3 1/16 in. exhaust pressure rises to 5¾ in., that is, considerably higher than heretofore assumed according to Clark's experiments. The narrow smokestacks yield higher vacua than the wide ones, especially if tapered. For equal effects the total height h, Fig. 15, becomes consequently smaller the narrower the stacks.

In the curve of the funnel-shaped smokestacks, Figs. 5 and 9, a tangent occurs for the distances a—23⅝ in. and 39¾ in. According to Fig. 5 it first touches the curve of the otherwise equal double-cone smokestack, but rises above it with an increasing value of a. For a small distance only does the curve of the funnel fall below the other, due to the air admission being then more impeded. A comparison of the two curves shows, first, that beginning with $a = 23⅝$ in. (that is, for a real distance of 5⅞ in. of the exhaust nozzle from the bottom of the funnel-shaped stack), the air is as well admitted as in the double-cone stack; second, that beginning with values of a above 28 5/16 in. (equal to twice the diameter of the stack at this point, or about .4 of the total length above the exhaust), the greater length of the funnel-shaped stack has a good effect, and that consequently only that part of every smokestack above this height has any effect at all. The same result follows from a comparison of the smokestacks of other sizes. Smokestacks of equal effect for unequal taper are approximately obtained if they are given the same diameter at the middle of the upper part of 3 ft. 4⅛ in. in length.

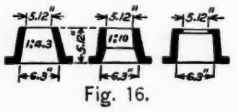


Fig. 16.

EXPERIMENTS WITH SHORTENED SMOKESTACKS.

The curves are shown in Figs. 6, 7, 8 and 9. It will be seen on Fig. 6 that in stacks shortened 11 13/16-in. and 19 11/16-in. respectively, the same vacuum of 3 5/32-in. is obtained for values of a, equaling 19 11/16 in. and 27 9/16 in. which proves again the ineffectiveness of that part of the stack lying below $a = 28\frac{9}{16}$ in. For greater values of a the base of 17¾-in. diameter apparently begins to take effect and influences the result, thus an equally high vacuum is reached as previous to the shortening before the top of the stack again reaches the original height. This takes place in increased ratio with the three tapered stacks for all distances, because the steam jet fills them the better the higher they are placed. For equal effects, the stack, when shortened at the top and placed higher, has consequently a less total length h than the original smokestack, if both have the same least diameter.

Some experiments with bridges in the exhaust pipe were made. A satisfactory draft was finally obtained for the locomotives mentioned in the beginning by the insertion of triangular bridges into the exhaust nozzle, the latter being correspondingly enlarged. These bridges effect a quicker broadening out of the steam jet and consequently more complete filling of wide and short stacks. Figs. 10 and 11 show the vacuum for an exhaust pipe of 4¾ in. diameter without bridge and for one of the same cross-section of 5⅛ in. diameter, with a bridge ⅝ in. wide. The bridge had a rectangular lower edge, was 5/16-in. high, and its upper face was made level with the face of the exhaust.

In the full-length double-cone smokestack, tapered 1:12 of 13¾-in. diameter, which was already well filled, the bridge raises the effect only for values of a up to 26-in. according to Fig. 10, above that it lowers it; in the 19 11/16-in. shortened stack equal effects are obtained for $a = 16\frac{5}{16}$ in. with bridge and $a = 28\frac{5}{16}$ in. without bridge. The employment of the bridge, therefore, permits shortening the stack 11⅝ in. More clearly yet is the effect shown in Fig. 11, this being for a funnel-shaped stack, tapered 1:12, of 13¾ in. lower diameter. The bridge has, according to the curves, a good effect on stacks which proportionately are so wide or so short that they are not sufficiently filled by the undivided steam jet. Only the width of the face of the bridge counts; an increase in its depth is injurious. It is recommended to make bridges of square iron rods and fix them with their greatest width in the mouth of the nozzle. Bridges below 5/16-in. face have no effect at all.

The shape of the steam jet was determined by measuring its distance from the rings piled on successively up to a height of 29¾ in. The cone-nozzle of 5½ in. upper diameter and 6 5/16 in. lower diameter, and 5⅛ in. in height, yielded for the greatest changes in steam pressure a cone jet whose face tapered 1:2.4. The insertion of the aforementioned bridge into this nozzle gives an elliptic section to the jet of 1:2.45 taper in the plane of the cone and from 1:1.5 to 1:1.6 at right angles to it. This explains the effect of the bridge. These data refer to that part of the outer face of the jet which is only slightly mixed with air. It begins to curl up above 23¾ in., and consequently only in a greater height can it have a sucking effect upon the air. In a smokestack the broadening out of the steam jet is apparently the more impeded by the escaping fire gases, the narrower the smokestack is. Conclusions can therefore not be drawn from the shape of the free jet upon its effect in the stack. A variation of the shape of the exhaust nozzle according to Fig. 16 did not result in noticeable differences in the broadening of the steam jet.

Spitting of smokestacks occurred with the stacks which were narrow at the mouth, when the upper width was narrower than would correspond to a broadening of 1:4.5 to 1:5 of the cone of the jet. It seems, therefore, that the water carried along by the jet, remains mostly in its center, a fact that can be demonstrated on locomotives in warm, dry weather. Spitting smokestacks seem to have an uneven fanning effect upon the fire.

EFFECT OF THE EXHAUST PIPE IN MOVING LOCOMOTIVES.

Conditions for Advantageous Combustion. — The greatest possible reduction of the amount of surplus air is favorable to complete combustion and the development of heat. Both can be obtained only by an even and sufficiently strong air influx. Variable influx of air produces alternately great air surplus with cooling of the fire gases, and subsequent lack of air with incomplete combustion, accompanied by the presence of smoke and carbon monoxide.

The sufficient force of the draft has been taken care of in the locomotives by the great exertion of the boilers, they burning per square foot of grate area from four to six times as much fuel as other boilers. This rapid combustion and the high temperature thereby obtained constitute the principal advantages of the locomotive boiler.

The force of the draft and the rapidity of combustion are limited by the quality of the fuel. Hard lump coal, pressed coal and coke will stand strong blowing, pea and slack coal which require a thin fire, only slight blowing. Too strong draft will carry off too many unburnt particles of fuel, forming smoke and carbon monoxide, which is not a rare occurrence in American locomotives because of overtaxing the boilers. The strongest draft at the moment of the steam blow must not exceed the aforementioned limit. The total efficiency will, therefore, be a maximum, the nearer the average draft comes to the strongest draft, that is, the evener the effect of the exhaust pipe.

Fig. 17.—Single and Double Exhaust Pipes.

Effect of the level of the Exhaust Nozzle.—But the draft must also affect evenly all parts of the grate to produce an even fire. This necessitates a certain fixed location of the exhaust nozzle to the smokestack, that is, a certain filling up of the smokestack by the steam jet. If the exhaust nozzle stands too high, then the gases will principally flow through the upper tubes and the fire on the rear part of the grate lies dead; the effect of the exhaust pipe and the steam production are insufficient; the fire is all broken up in front, and a great deal of flying cinders is the result. If the exhaust nozzle stands too low, the gases will flow mainly through the lower tubes, the fire burns principally on the rear part of the grate; the exhaust acts unevenly and produces quantities of flying cinders; the steam production is insufficient, and priming is also occasionally noticed.

The height of the nozzle above the middle of the boiler has apparently no appreciable effect, as an even draft is obtained as well for high as low location.

These phenomena, whose causes have as yet not been explained, have been found to exist in the most varied types of locomotives, also with those having corrugated tube boilers, and always occurred in the same order. All the respective locomotives had tapered smokestacks, and the experiments on the apparatus have shown the effect of the exhaust pipe with them to be stronger than with the cylindrical ones.

Brick arches with which several locomotives were equipped, and the care taken of the fire by the fireman proved to be without much effect upon the burning of the fire; the kind of draft, which may be recognized from the adherence of flying cinders in front of the tubes

* Condensed from an article by Mr. A. von Borries, Director of Prussian State Railroads, in the *Organ für die Fortschritte des Eisenbahnwesens*, January, 1896.

in the firebox, and which was also found to exist by taking the temperatures in the smokebox close to the tubes, always made itself felt.

With a correct location of the exhaust nozzle in relation to the smokestack the fire will burn evenly all over the grate without tearing holes in spots. *Vice versa*, an even fire will prove the location of the exhaust nozzle to be correct. In the ordinary locomotive, without arch a trifle more of the gases will flow through the lower tubes. They will flow evenly through all the tubes by the use of arches of one-third the length of the firebox, and more will flow through the upper tubes if the arches are made longer, as is customary in England. In corrugated tube boilers, with simple fire bridge, without additional obstructions the gases will mainly flow through the upper tubes.

The American Deflector Plate in the Smokebox.—While throughout Europe a satisfactorily even flow of the gases is obtained by the proper location of the exhaust, American locomotives with extension fronts are supplied with a deflector plate which covers somewhat more than the upper one-half of the tubes, and is adjustable as to length. This plate was introduced there simultaneously with the extended smokebox. It deflects the gases toward the bottom of the smokebox and forces them more through the lower tubes. It was thought there that without these deflector plates the locomotives do not make sufficient steam. It could not be ascertained whether this plate was necessitated by the longer brick arch, which have of late come into use, or by the particular air currents in the long smokebox. At all events, it is not desirable, as it impedes the draft of air and thus requires stronger exhaust action. The gases directed downward sweep the ashes and cinders from the bottom of the smokebox and eject them through the smokestack.

With corrugated tube boilers this plate has been tried without avail; it produced a thick cover of flying ashes in front of the upper fire tubes and impeded the steaming. One should, therefore, endeavor to get along without this plate, and should be careful of the simultaneous use of very long smokeboxes and brick arches.

Effect of the Steam Jet in the Smokestack.—In a running locomotive, as soon as the slide valve opens the exhaust ports, the steam behind the piston quickly escapes in consequence of its pressure until this pressure is greatly reduced. The remainder of the steam supplied to the cylinder is pushed out by the returning piston—that is, it flows out slowly. The exhaust, therefore, acts partly by the first forcible escape, or outpuff, partly by the subsequent outflow. That fraction of the entire effect due to the outpuff is the larger the higher the residual pressure of the steam in the cylinder.

The time consumed by the outpuff depends on the quickness of the slide valve in opening the exhaust ports. If the valve is slow of action, the outpuff is retarded and distributed over a longer period, in which case there is no sudden blow. Such a blow will occur the more, the more suddenly the valve opens the exhaust ports. As a matter of fact a hard steam blow seems to occur in twin locomotives, if the product of steam supply and number of revolutions exceeds the figure 0.5.

As a rule, high speed and small supply, that is, small end pressure in the cylinder, are coincident, as also slow speed and large supply, that is, high-end pressure. During decreasing speed, therefore, the effect of the exhaust pipe becomes more and more uneven through the stronger steam blows, as well as through the longer intervals between blows and the slower subsequent outflow, though the force of the blows also decreases. During high speeds the draft is in general, more even. The effect of the steam blow is the harder the more rapidly it leaves the exhaust pipe during sufficient train speed, that is, the greater the diameter of the exhaust pipe. For medium speeds narrow nozzles produce, therefore, more even effects than wide ones by retardation of the blows, and consequent better filling up of the intervals between blows. The effect in the smokestack of the steam jet depends on the shape of the latter. Careful researches regarding the pressure, in the mouth of the nozzle, of gases and steam escaping from a short, conically converging nozzle have shown it to be one-half of the static pressure below the nozzle. This pressure immediately spreads the jet conically where it leaves the nozzle as exemplified by the experiments on the apparatus previously described.

If the exhaust pipe has a low, knee shaped base with lateral admission, the steam will arrive in a horizontal or slightly inclined direction; consequently the vertical velocity v must almost solely be produced by the pressure p in the base; hence $p = \frac{m\,v^2}{2g}$.

If the exhaust pipe has a long, vertical cylinder-base, in which there is already a vertical velocity v_1, the pressure necessary below the exhaust pipe is only $p_1 = \frac{m}{2g}(v^2 - v_1{}^2)$, hence, to raise the velocity from v^1 to v $\frac{p^1}{p} = 1 - \left(\frac{v^1}{v}\right)^2$ or, if the cross-sections of the pipes are substituted for the velocities, the differences of pressure being small, then $\frac{p^1}{p} = 1 - \left(\frac{f}{f^1}\right)^2$.

The nozzle = mouth pressures are of the same ratio, because they are = $\frac{p}{2}$ and $\frac{p_1}{2}$. This pressure and consequently the spreading of the steam jet is smaller with a long vertical base for the exhaust pipe, than with a low knee, and it is the more reduced the narrower the vertical base is. Besides, there are strong eddy currents in the knee bases of the twin locomotives, and in the one-sided knees of compound locomotives there occurs even spiral torsion of the steam jet causing spreading and roughness, while a blast pipe with a long base will produce a smooth jet.

These phenomena prove the adjustment of the experimental apparatus to have been not quite correct, since with it the steam jet of a locomotive with knee, and that from the long base of the apparatus had been assumed to be alike. The incorrectness of the assumption was not known at the time. In the light of the foregoing, the apparatus was adjusted to a slightly too small air influx and its results, therefore, yield smokestacks that are proportionately too narrow. The experiments, it is expected, will be extended to the effect of steam jets from different bases. If it is assumed that spreading of the steam jet increases as the square root of p, then for the apparatus we would have $\sqrt{\frac{p_1}{p}} = 0.82$; an exhaust pipe with knee-base consequently would have resulted in smokestacks wider in proportion of $1 : 0.82 = 1.22$ times wider. Again, during the first part of the steam blow, which takes place with increasing pressure in the base and with increasing speed of escape, the pressure in the plane of the mouth of the nozzle will be greater than during the subsequent flow, which is partly a consequence of the velocity still existing in the exhaust pipe. It follows that the steam jet spreads more during the blow than during the subsequent flow, and this was found to be true by observations of the jet from the open door of the smokebox. Again, the escaping steam blow finds ahead of it quantities of steam which move at a lower speed. It runs up against them and thereby spreads still more. Hence each steam blow forms a ball which is driven up the smokestack putting the mixture of steam and fire gases into quicker motion. After the passing of the steam blow this quicker motion will continue for a short period of time in consequence of the inertia; the slowly following steam jet is consequently drawn out and is contracted. The alternating contractions and expansions of the steam jet already produced by its spreading are, therefore, still more augmented in the smokstack by the inertia of the quantities of gas and steam set in motion and both will grow more violent with the increasing force of the steam blow.

As the successive steam balls fill up the smokestack more than the smooth, thin steam jets, they will, of course, be more effective in proportion than the latter, whereby the unevenness of the draft is still more increased This changing shape of the steam jet is another obstacle to the immediate application of the results obtained from the apparatus upon locomotives in motion

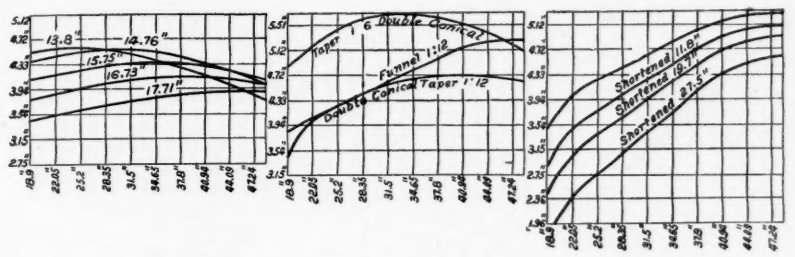


Fig. 1.—Five Cylindrical Stacks of various diameters.

Fig. 5.—Comparison of 3 stacks, upper diameter 18.4 in.

Fig. 9.—Funnel Stack, taper 1 : 12, 13.8 in. lower diameter; three abridgments.

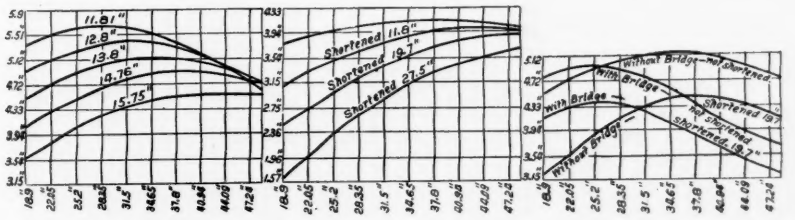


Fig. 2.—Five Double Conical Stacks taper 1 : 12, of various diameters.

Fig. 6.—Cylindrical Stack, diameter 15.75 in.; three abridgments.

Fig. 10.—Double Conical Stack, taper 1 : 12, diameter 13.8 in.; compared with and without bridge.

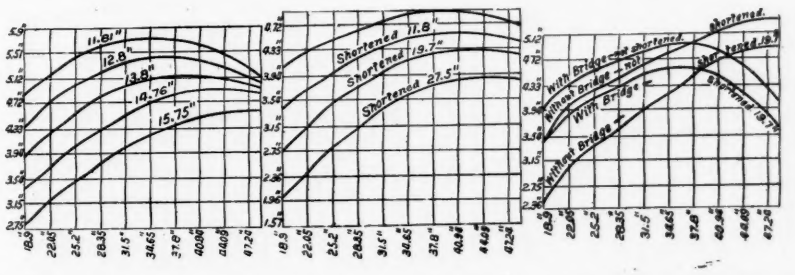


Fig. 3.—Five Double Conical Stacks, taper 1 : 6, of various diameters.

Fig. 7.—Double Conical Stack, taper 1 : 12, diameter 14.76 in.; three abridgments.

Fig. 11.—Funnel Stack, taper 1 : 12, diameter 13.8 in.; compared with and without bridge; stack unabridged.

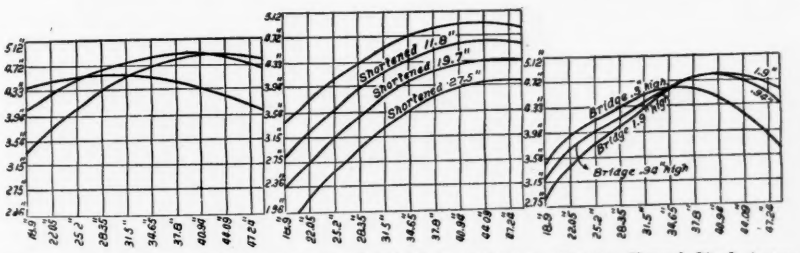


Fig. 4.—Comparison of stacks of various taper, and 14.76 in. diameter.

Fig. 8.—Double Conical Stack, taper 1 : 6, diameter 14.76 in.; three abridgments.

Fig. 12.—Funnel Stack, taper 1 : 12, 13 8 in. diameter; 19.7 in. abridgment; comparison using bridges of various heights and 0.6 in. broad.

Experiments with Locomotive Exhaust Pipes and Smokestacks.

The Cost of Air-Brake Gear.

We find in the report of the February meeting of the North West Railway Club the following letter, addressed to Mr. Brooke, the President of the Club:

In the report of the November meeting of the New York Railroad Club, given in the *Railroad Gazette* of Jan. 17, are found the following remarks by Mr. Parke, of the Westinghouse Air Brake Company: "For instance, Messrs. Jackson & Woodin are to-day offering to sell to railroads the M. C. B. brake gear complete, for a price about one-third of the lowest estimate that he (Mr. Parke) has ever seen handed in by Master Car Builders to their superior officers." Of course, this remark does not commit Mr. Parke to anything definite, since he does not specify what estimates he may have seen, but anyone reading the above would naturally be led to the conclusion that it cost a railroad company at least three times as much to apply air-brakes, or rather to manufacture the brake gear, as it does a manufacturing concern, and in that way certainly casts a severe imputation on the efficiency of the machinery department of the railroads where Mr. Parke is acquainted with the Master Car Builders. Not only does it apply to roads where he is known to have access to any estimates that might be made up, but other roads, and especially Western roads with shops—presumably less well equipped with special machinery than those of the older roads in the East—are liable to get the impression from his remarks that there is a large saving to be made by buying this material direct from some manufacturer.

In an estimate recently made by one of the roads running into St. Paul, the total cost of making the material

required for applying air-brakes to a 36-foot car, exclusive of the material received from the air-brake company, but including the road's standard trussed brake beam and all pipe and fittings, was estimated at $28.68. This estimate, as far as labor was concerned, was not based on large orders, but was the actual cost of work that had been turned out in small quantities previously, and the actual cost of the work which is being turned out is running considerably below that estimated. We shall be in a position in a few weeks to give the actual cost to this road of turning out the work in comparatively large quantities, but for the present we will simply confine curselves to the estimate which we can assure you is higher than the actual cost of the work.

Of the $28.68 the material cost $21.56, the labor $7.12. These are actual costs, without anything added for depreciation, storehouse expenses or superintendence. The cost of the material is based upon iron at a price of $1.35, with extras as per list bought f. o. b. St. Paul.

Now, while we would not mind admitting that Messrs. Jackson & Woodin might reduce the cost of the labor to a certain extent, it is highly improbable that they could reduce the price of their material unless they used a very inferior grade of iron. Even supposing their labor costs them nothing at all, they would have to reduce the cost of their iron to about 60 cents to be able to compete at one third of the above estimate. As a matter of fact, this statement of Mr. Parke's is entirely misleading, and instead of saying that they could furnish the air-brake material at one-third the cost of the estimate made by the railroad company, if he had stated that a railroad company with properly-equipped shops could make their own air-brake material as cheaply as any manufacturing concern could supply it to them, he would have been a great deal nearer the truth, and he would have avoided making a statement which, from a man in his position, is liable to give general officers of railroads the impression that their machinery departments are poorly managed.

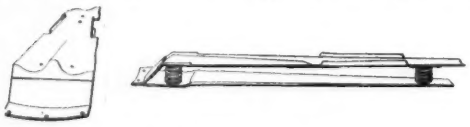
In the discussion it appeared that Mr. Pattee and Mr. Vaughn, of the Great Northern (and perhaps others), signed the letter, which was forwarded to the New York Railroad Club as a communication from the North West Railway Club.

The Green Safety Guard.

The firm of Roberts, Thorp & Co., of Three Rivers, Mich., is now making a device known as the Green safety switch, frog and guard rail block. This, as its name implies, is a block to fill up the space between two rails where they are near together, as at switches and guard rails, and does away with the danger of a person catching his foot between the rails.

These blocks are made in different forms and lengths, adapting them for split or stub switches of all sizes, for rigid or spring frogs of all numbers and all angles and lengths of guard rails.

The blocks, as shown by the figure, which gives a side and surface view of a toe block 40 in. long, are made of an upper and lower plate of steel, so connected at the heel as to exclude snow and ice and also join the two plates firmly together. The upper plate is upheld by



two springs, graduated to resist 300 pounds pressure. Shorter blocks are made for frog wings and short bent guard rails where but one spring of the same resistance is used. The lower members, or plates, are firmly seated on the rails or ties, while the upper ones are normally on the same level with the head of the rails, and while conforming in shape so as to accommodate the flanges of the wheels at all times, also prevent the foot from passing below the level of the head of the rail.

Owing to the accidents to persons, caused by getting a foot caught between the rails, a law has been passed in Ohio requiring the railroads in the state to block all frogs, switches and guard rails by Oct. 1, 1898. Similar laws have been in force in a number of states for several years. The Lake Shore & Michigan Southern, the Michigan Central, the Big Four and the Cincinnati, Hamilton & Dayton are already using the Green safety blocks, which are giving excellent results.

The Westinghouse and General Electric Treaty.

An agreement which may be very important in its effects has been entered into by the Westinghouse Electric & Manufacturing Co., and the General Electric Co. Precise details of the arrangement are not given out, but the statement below is official and says all that the representatives of the companies are prepared to say to the public now:

"Negotiations between the General Electric Company and the Westinghouse Electric and Manufacturing Company have resulted in an arrangement with respect to a joint use of the patents of the two companies, subject to existing licenses, on terms which are considered mutually advantageous.

"It has been agreed that after certain exclusions the General Electric Company has contributed 62½ per cent. and the Westinghouse Electric and Manufacturing Company 37½ per cent. in value of the combined patents, and each company is licensed to use the patents of the other company, except as to the matters excluded, each paying a royalty for any use of the combined patents in excess of the value of its contribution to the patents.

"The patents are to be managed by a board of control, consisting of five members, two appointed by each company and a fifth selected by the four so appointed. Both companies have acquired during their existence a large number of valuable patents, and numerous suits have been instituted in consequence of the infringement of these patents by one party or the other, or by their customers. In the prosecution of these suits large sums of money have been expended, and the general expenses of the companies have in this manner been greatly increased. It is expected that the economies to be effected will be very considerable, and that the two companies and their customers will be mutually protected.

"The especial incentives which led to the arrangement at this time were the recent decisions in favor of patents of the General Electric Company controlling the overhead system of electric railways, the approaching trials on a number of other important General Electric patents on controllers and details of electric railway apparatus and system and other electrical devices, and the equally strong position of the Westinghouse Company in respect to power transmission, covered by the patents of Nikola Tesla, and in view of its other patents in active litigation, some of which are of controlling importance."

It is easy to see that a working agreement under which these two great corporations would cease litigation and other methods of patent warfare would be of great economic advantage, not only to the stockholders of the companies, but to the general public. An immense amount of money and of energy have been wasted the last few years in the perpetual struggle for control which has gone on between these companies. We say wasted because the public has gained nothing and the companies are by so much the poorer. If the result of this agreement is to stop the struggle for control of patents, and to confine the energies of the companies to that legitimate struggle which takes the shape of cheaper and better methods and products, the public will be a great gainer.

The Fortunes of Civil Engineers From Cornell.

Professor Fuertes, Director of the College of Civil Engineering, Cornell University, has just issued the following circular giving information of the fate of the 386 graduates of that college since its foundation. The circular contains a detailed table, which we do not reprint, the summary here given being drawn from it. Class II. includes 35 "engineers in practice" out of the total of 103 in that class. What follows is verbatim from the circular:

The College of Civil Engineering of Cornell University was organized a little over 20 years ago. Of the total number of graduates, 28 members have died, or about 7 per cent., thus leaving 358 alumni now in the world. These have been classified in the manner indicated above, into nine professional ranks, which show with fair accuracy the relative professional importance of the places reached by our graduates. The following table shows more plainly the probabilities that every hundred men who are graduated from this University College have of belonging to any one of the nine professional ranks for which their education is available:

Professional rank.	Percentage of employment for each rank.
I. Presidents	4.47%
II. Chief Engineers, Superintendents and Managers	28.77%
III. Professors	10.34%
IV. Assistant Chiefs, Resident and Division Engineers	6.98%
V. Assistant Engineers	20.11%
VI. Draughtsmen	3.92%
VII. Allied Professions	14.52%
VIII. Miscellaneous	6.15%
IX. Not heard from	4.74%
Total	100%

It will be seen that a little over one-half of our graduates are found among the four highest ranks of professional life. Also, that this number is probably larger, by additions from rank VII., which contains about 14 per cent. of our alumni, who are as likely to secure satisfactory positions as the members of the highest ranks.

Class VIII. contains the men who have left the profession for other callings and number about 6 per cent. of all the graduates in civil engineering; but while this number is insignificant under any circumstances, it may be proper to say that a majority of these men were unable to obtain employment during the protracted financial panic which began on the memorable "Black Friday" of 1873, and were thus thrown into other channels to earn their livelihood. It may be added that five of these men were obliged to leave the profession through the death of parents, which forced upon them the care of their estates; three, on account of ill health, reside in Florida, and but very few of this class of graduates have taken to other callings by reason of distaste, or for unknown reasons.

In Class IX. are included the 31 members of the class graduating at the time of taking the census, 20 of whom had previously secured positions in spite of the industrial depression still being felt by the entire country. The men classified in Class IX. as "not heard from" refer mainly to foreigners living in distant countries, many of whom are not easily reached by mail.

Class VI. is significant, for it shows that although the engineer usually enters his profession through the "Draughting Room," our graduates do not remain there long, and only four of them are really draughtsmen. The other 10 draughtsmen in this class are generally computers or designers of structural work.

This census is published for no other purpose than to answer the repeated inquiries upon the points to which it refers by young men asking for details upon the prospects of the civil engineering applicants who have the aptitude and required preparation to enter our courses of study.

Accident Averted by the Dresden Sand Track.*

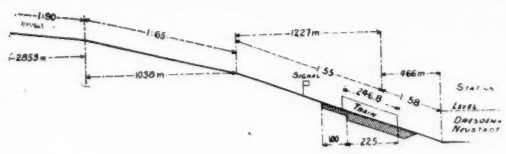
On Dec. 21, 1895, the fast freight train from Görlitz to Dresden (Saxon State Railway) got away from the control of the driver and brakemen, and entered the open switch of the sand track in the Friedrichstadt switching yard. The inclination was 1 in 55. The train had 55 axles or 27 cars, and was provided with 8 brakemen for 9 cars; it had a length of 246.8 meters, and weighed, inclusive of engine and tender, 417 tons of 1,000 kilograms. The position of the train in the sand track after having come to a standstill is represented by the sketch.

* For a description of this sand track see the *Railroad Gazette*, Jan. 3, page 12.

Having passed a thin sand-layer of 100 meters in length the train (with the locomotive ahead) entered the track, provided with a sand layer of five centimeters in thickness, and then stopped. The signal guard estimated that its velocity before being slowed and stopped by the sand track was 40 km. (25 miles) per hour. This velocity of $11\frac{1}{9}$ meters per second is equal to a height of fall of $\frac{11\frac{1}{9}^2 \times 1.055}{2 \times 9.81}$ equals 6.6465 meters; (the *vis viva* of the wheels being estimated as 5.5 per cent. of that of the total inert movement of the train and 9.81 meters being the acceleration of gravity). To this there must be added the head caused by increased velocity due to the incline of the track from the entering point to the stopping point, or 5.87 meters; and from it should be deducted the passive resistance on a level track, this ratio being $\frac{1}{200}$; therefore the action of gravity will be $5.87 - \frac{325}{200}$ equals 4.25 meters, the total length run in the sand track being 325 meters. The combined stopping action of the sand track and the brakes is then estimated to be, weight of train × (6.6465 + 4.25) meters.

The sum of the products of the weight of every car on the fully-covered sand track by the distance traversed by each is 45,367.9 ton-meters.

The product of the train weight on the thinly-strewed sand track, by the distance traversed, is as follows: Cars 28 and 29, weighing 16.9 tons, have gone 88.75 meters; the



The Dresden Sand Track.

rest have gone the whole length; then the product is 16.9 × 88.75 meters + (417—16.9) × 100 meters equals 41,510 meter tons.

The resistance which the train met on the thinly-sanded track being about one-fourth that on the fully-sanded rails, the retarding effect of the sand-track is estimated at $45,367.9 + \frac{41,510}{4}$ equals 55,745 meter-tons.

Now as the total energy of the train under the supposition of an initial velocity of 40 km. per hour is 417 tons (6.6465 + 4.25) meters equals 4,543.84 ton-meters, the co-efficient of resistance will have been

f equals $\frac{4,543.84}{55,745}$ equals 0.0815.

The trials made in order to find the co-efficient of resistance on a sand-track having given a value of f equals $\frac{1}{16}$ to $\frac{1}{12}$, the brakes could not have given a suitable effect if the velocity had been only 40 km. an hour. But the driver, according to his own declaration, had already lost control of the train as it entered the grade of 1 in 65; and the train had been accelerated through about 2,000 meters on grades of 1 in 65 and 1 in 55; hence it is probable that the train entered the sand-track at a speed greater than 40 km. It is also probable that the brakes which slipped when the train was on the wet rails, had their action increased when it came on the sand.

The happy issue of this occurrence, which, under similar circumstances some years ago (Oct. 12, 1890), caused a disaster,* is all the more worthy of notice as there were partially or entirely empty cars (Nos. 5, 9, 10, 13 and 21 of the table) between loaded ones; yet there was no raising of the cars nor derailment.

The train, after the track was cleared of sand and the switch opened at the lower end of the sand-track, continued on its way with a delay of only 24 minutes. The sand layer was then replaced.

* On this occasion the driver of the switching train was killed, the cars left the rails and were broken into pieces which were thrown on to and injured the foot-bridge in Lössnitzstrasse.

A Railroad's Relief Department.

BY L. W. REILLY.

[The Baltimore & Ohio Relief Department has existed for over 15 years, having been run as an independent organization for about eight years, and until deprived of its charter by political meddlers, and since then as a department of the railroad company. We have recorded its career from time to time since its beginning, but the following statement is the most complete account of the organization that we have ever seen.—EDITOR.]

The Baltimore & Ohio Railroad Company established in March, 1889, for the benefit of its employees, a Relief Department, which has so many admirable features that other corporations as well as students of social economy will be interested by an exposition of the details of its operations.

At the start, the company assumed general charge of the department. It provided office-room and furniture; it gave the services of managers and clerks; it granted the use of its facilities; it became the custodian of the funds; and it guaranteed the faithful performance of the obligations of the enterprise.

The department is controlled by a special committee of directors of the company. They are aided by two advisory committees, one for the lines east of the Ohio River, and the other for the lines west of that stream. These advisory committees each consist of seven members—the General Manager of the road for that

division and two employees from the Machinery Department, two from the Transportation Department, and two from the Road Department, elected by their fellow-members. Subject to these committees but in direct management of the Relief Department is a Superintendent. He is helped by an assistant superintendent, an actuary and a force of clerks.

The department is divided into three sections, called the Relief, the Savings, and the Pension Feature.

The Relief Feature affords relief to its members when they are disabled by injury or sickness, and to their families after their death.

The Savings Feature affords opportunity to the railroad employees and their near relatives to deposit with it their savings, and earn interest thereon; and to employees only it offers to lend money at a moderate rate of interest and on easy terms of repayment, for the purpose of acquiring or improving a homestead or freeing it from other debt.

The Pension Feature makes provision for those employees who, by reason of age or infirmity, are relieved or retire from the service of the company.

The railroad contributes to the department every year the following amounts:

1. The sum of $6,000 for the support of the Relief Feature, or, when not needed for that feature, for the support of the Pension Feature.

2. The sum of $25,000 for the support of the Pension Feature.

3. The sum of $2,500 for the physical examination of employees.

THE RELIEF FEATURE.

Membership in the Relief Feature is voluntary for:

1. Officials receiving an annual compensation of over $2,000.

2. Employees who entered the service prior to May 1, 1880, and who have been continuously therein since that date, except members of the Baltimore & Ohio Employees' Relief Association.

3. Clerks, telegraphers and others of similar employment, who are in no degree exposed to accidents in the service.

4. Agents receiving commissions only and employees receiving $20 per month or less.

All of these persons may acquire membership in either the sick benefit or the natural death benefit of the Relief Feature, or both, but not in the accidental injury or the total disability benefit. Having once become members, they must continue so while in the service.

All other persons employed by the company must, as a condition of employment or advancement, become full members of this feature, entitled to all its benefits, before being permitted to go on duty.

So stringently is this regulation enforced that it is compulsory on all classes of employees, whether called regular, extra, temporary or constructive force, and it is imposed even on persons who are on probation or learning their duties, although not then receiving pay from the railroad.

The only exception to this rule allowed is in cases of great emergency, when the service of extra help is absolutely necessary on short notice and for a brief period. Even then, work will be given only for two days, unless application be made for admission into the Relief Feature.

No person, however, who is over 45 years of age, or who is not in good physical health—to be determined by a physician employed by the company—will be allowed to join.

Before a man can get employment from the B. & O. Railroad, therefore, he has to sign a contract applying for membership in the Relief Feature, agreeing to be bound by its regulations, consenting to have a deduction made for it monthly from his wages, and declaring that in consideration of the contributions of the company to the Relief Department, and of the guarantees by it of the payment of the benefits promised, the acceptance of benefits from the Relief Feature for injury or death shall operate as a release of all claims against the road for damages by reason of such injury or death, which could otherwise be made by or through him.

The beneficiary or beneficiaries named in any application for full membership in the Relief Feature, must, if the applicant be single, be his father and mother; or the survivor, if he be married, must be his wife or his wife and children.

Employees who have been furloughed (that is, put off work for a while without fault on their part) or suspended (that is, laid off for a while as a penalty for slight offenses not deserving a permanent discharge) may maintain membership in the natural death benefit only, while out of the service of the company, by making the usual monthly contribution. But, if they remain away longer than six months, they will have to submit to all the requirements exacted from new employees.

Persons who have once become members must continue so while in the service. Whenever a member quits the employment of the company, his membership will, as a rule, terminate on the date of his departure, unless he applies within 10 days for the natural death benefit only.

Members are divided into two general classes:

First Class.—Those engaged in operating trains or rolling stock.

Second Class.—Those not so engaged.

These are further divided according to their average monthly pay, as follows:

A. Those receiving not more than thirty-five dollars.

B. Those receiving more than thirty-five and not more than fifty dollars.

C. Those receiving more than fifty and not more than seventy-five dollars.

D. Those receiving more than seventy-five and not more than one hundred dollars.

E. Those receiving more than one hundred dollars.

The contributions for these classes are per month in advance, as follows:

	A.	B.	C.	D.	E.
First Class	$1.00	$2.00	$3.00	$4 00	$5.00
Second Class	75	1 50	2.25	3.00	3.75

The contribution for the natural death benefit only, is at the rate of 25 cents a month for every such benefit of the lowest class.

Members of the Relief Feature are entitled to benefits as follows:

First.—Payments while totally disabled by accidental injury received in the discharge of duty in the service, for each day other than Sundays and legal holidays, during a period not exceeding 26 weeks, at the rate of 50 cents a day for a member of the lowest class, and at a higher rate for members of the other classes in proportion to their contributions; and at half these rates during the continuance of the disability after the first 26 weeks.

Second.—Payments while totally disabled by sickness or from any cause other than accidental injuries received in the discharge of duty in the service, for each day other than Sundays and legal holidays, after the first six working days of such disability, and for a period not exceeding 52 weeks, at the rate of 50 cents a day for a member of the lowest class and at higher rates for members of the other classes in proportion to their contributions.

Third.—Payment on the death of a member of the lowest class from accidental injuries received in the discharge of his duty in the service, of $500, and of greater amounts for the other classes in proportion to their contributions.

Fourth.—Payment on the death of a member of the lowest class from any cause other than accidental injuries received in the discharge of duty in the service, of $250, and of greater amounts for the other classes in proportion to their contributions.

Fifth.—Payment of fees for such surgical attendance as the company's medical examiner approves as necessary in consequence of accidental injuries received in the discharge of duty in the service, at the rates fixed in a schedule adopted by the Relief Department, when the bills therefor are approved by the local medical examiner. The Superintendent will arrange for the admission of members to hospitals, at moderate cost, when requested.

The following table shows in brief the contributions and the benefits of the several classes:

	A.	B.	C.	D.	E.
Rates of contributions per month:					
First-class	$1.00	$2.00	$3.00	$4.00	$5.00
Second-class	.75	1.50	2.25	3.00	3.75
Entitling to benefits for accidental injuries, per day, not including Sundays and legal holidays:					
First 26 weeks	.50	1.00	1.50	2.00	2.50
After 26 weeks	.25	.50	.75	1.00	1.25
For sickness, per day, not including first six working days, Sundays or legal holidays, for 52 weeks	.50	1.00	1.50	2.00	2.50
In the event of death from accidental injuries	500.00	1,000.00	1,500.00	2,000.00	2,500.00
In the event of death from natural causes	250.00	500.00	750.00	1,000.00	1,250.00

Any member under 50 years of age, who can pass a satisfactory medical examination, may enter a higher class than that to which his pay assigns him, or may take additional natural death benefits, provided his total natural death benefits shall not exceed five times the natural death benefit of a member of the lowest class.

Any such member who has obtained a loan from the Savings Feature of the Relief Department may take additional natural death benefits to a sum total equal to the amount loaned, provided that, in every such case, the additional natural death benefits shall be reduced as the amount due on account of the loan is reduced.

Benefits will not be paid for injury or sickness, which is in any way caused or increased, in whole or in part, by intoxication, the use of intoxicating liquors, sexual immorality, breach of the peace, or other violation of law, on the part of the member; or for death by the hands of justice.

In the event of disability or death from accidental injuries, benefits will not be paid until releases are filed with the Superintendent of the Relief Department freeing the company from all claims for damages by reason of such injury or death, signed by all persons who might bring suit for such damages, or those legally competent to release for them, and by the beneficiaries named in the respective applications.

In case a suit is brought by a member, his beneficiary or his legal representative or others against the company on account of injury to him, no benefit shall be paid, and all claims to such benefit shall be forfeited, unless the suit is discontinued and all costs incurred by the railroad because of it are paid by the plaintiff before any hearing or trial on demurrer or otherwise. Similarly, in case of death, should suit be entered by any person claiming an interest in the life of the deceased member, no benefits shall be paid from the Relief Feature, and any payment of damages or costs incurred in the action will act as a release in full of all claims against the department.

The benefits on account of the death of a member will be paid to the beneficiary designated in the application, and these beneficiaries are limited to parents, wives and children. Why should not brothers and sisters, sweethearts and others be allowed to be included by members who have none of the beneficiaries designated by the company? If no beneficiary named in the application of a member be living at his death, the benefits will lapse and remain for the benefit of the other members. In such a case, however, the funeral expenses may be paid, in whole or in part, by the Superintendent.

No assignment of benefits or change of beneficiary will be permitted without the written consent of the Superintendent, nor will benefits be subject to attachment or other legal process.

The benefits paid by this department (and its predecessor, the B. & O. employees' Relief Association) from May 1, 1880, to June 30, 1895, were as follows:

	Number.	Cost.
Deaths from accidents	1,014	$1,073,044.22
Deaths from other causes	1,996	912,690.50
Disablements from accidental injuries received in discharge of duty	56,168	720,384.55
Disablements from sickness and other causes than as above	80,026	1,179,252.55
Surgical expenses	32,678	157,963.26
Aggregate	171,882	$4,043,335.08
Add disbursements for expenses, etc.		574,210.70
Total disbursements		$4,617,545.78

The membership in the Relief Feature at the close of the last fiscal year consisted of 20,710 members, with an average monthly membership of 20,947.

The gross balance on hand June 30, 1894, was		$301,063.18
The receipts from July 1, 1894, to June 30, 1895, were	$365,993.47	
Interest on monthly balances and bonds and dividend on B. & O. stock	13,117.03	
Returns on account of artificial limbs furnished members, and from other sources	4,187.79	
		383,298.29
Total		$684,361.47
The disbursements made during the same fiscal year were:		
Relief Department checks cashed from July 1, 1894 to June 30, 1895		$361,006.57
		$323,354.90
Amount due from sundry persons on account of advances for artificial limbs, and from B. & O. R. R. Co. for interest, etc		$11,055.69
Total assets June 30, 1895		$334,410.59
The liabilities of the Relief Feature on that date were:		
Amount due sundry persons	$7,147.15	
Checks issued prior to June 30, 1895, and remaining then unpaid	9,688 10	
Claims for benefits, etc., for which checks had not been issued on June 30, 1895, and amount (estimated) due or becoming due on account of disablements which originated prior to July 1, 1895	66,216.62	
Total		83,051.87
Assets over liabilities, June 30, 1895.		$251,358.72

The benefits paid out from July 1, 1894, to June 30, 1895, were as follows:

	Number.	Cost.
Deaths from accidents	55	$61,812.00
Deaths from other causes	155	91,100.00
Disablements from accidental injuries	4,738	58,299.74
Surgical expenses	3,087	8,028.56
Disablements from sickness, etc.	5,720	87,913.98
Aggregate	13,755	$307,454.28

(To be continued.)

Hydraulic Interlocking.

Engineering of March 6 contains illustrations and a description of the Bianchi-Servettaz system for hydraulic interlocking as built and installed by Messrs. Saxby & Farmer. This is an apparatus for working and locking switches and signals through hydraulic pressure. Installations in various parts of the world, aggregating many thousands of levers, are in daily use. The fluid used is preferably a mixture of water and glycerine, carried in pipes laid underground, to double pistons fixed near the switches, or small single pistons on the signal posts. The necessary power is generated by a pump worked by hand, steam or gas. Each switch is moved by two pistons put in alternate communication with fluid under pressure and a discharge reservoir. When the switch has been moved the fluid is allowed by opening a valve worked by the switch lock to pass back to the signal cabin where it permits final movement of the switch lever, which unlocks the signal lever, which can then be moved. The first and partial movement of the switch lever turns on the fluid, unlocks the switch, moves it and locks it; then the fluid pressure returns to the cabin and releases the switch lever for further movement, when it can be pulled through the remainder of its stroke, releasing the signal lever. This provides an infallible detector to each switch. The cabin apparatus is very small and compact. Signals are worked directly by fluid pressure or by ordinary wire connections worked by rams fixed in or near the cabin, and compensators are not required in either case. One lever unlocks, moves and relocks the switches and works the locking bar.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Western correspondents and reporters are still complaining loudly of the managers of the Joint Traffic Association, who, they say, are ruling things with an iron hand. The Grand Trunk's wicked reduction of the grain rate from St. Paul seems to have had no effect on the corn—little or none was shipped—but a tremendous noise was made about it and the Western roads withdrew certain privileges from the Eastern lines in retaliation for the action of the latter in getting the Grank Trunk to restore the rate that had been cut; but this withdrawal of privileges seems to have troubled no one, either railroad or shipper, so something else will have to do service as an issue. Eastbound freight is again rather light and the scare about the lion's share going to the Clover Leaf or some other outside road evidently is not feeling very robust just at present. The latest grievance of the downtrodden "public," if we may believe the reporters, is the resolution of the roads between Chicago and Cincinnati to refuse to issue regular through tickets in exchange for mileage coupons. It appears that where the selling of tickets through scalping offices has come to be a regular thing, one way of helping irregular proceedings to look regular has been to take up all the coupons for a journey at the ticket office at the starting point, thus relieving the passenger of the trouble of lying more than once. The drummers and other people who patronize scalpers look upon the resolution to stop this as an insult as well as an injury, of course, and every time it comes to their mind they utter another objurgation against the Joint Traffic Association. They think it very unbusinesslike to have tickets and fares regulated by the owners of the railroads, who live in New York, instead of by the officials who live in Chicago. We do not know how much influence the "iron hand" of the Joint Traffic Association managers exerts upon north-and-south business in Indiana and Ohio, which does not come within their jurisdiction; probably none whatever, except in so far as the success of the managers in their own field, in stopping wasteful and illegal reductions of rates, has encouraged other managers to stiffen their backbones. But whoever stops the prevailing abuse of mileage tickets will deserve much credit, whether he lives in New York or Chicago, and whether the effect is produced by a direct or an induced current. The rate on mileage tickets ought to be higher or else the local rates lower. Such a large difference as that now existing, by which the holder of a mileage ticket can travel 300 miles for a dollar or two less than the transient passenger, using a regular ticket, is a constant invitation to brokers to cheat; and, as every one knows, some railroads take a hand and help to cheat themselves. The difference in rate is unjustifiable, even if the regulations were not broken. It does not cost any less to carry the mileage-ticket holder. A reduction in rate may induce him to travel more than he otherwise would, but it is quite likely that a similar reduction to all passengers would have a stimulating effect of equal value to the road, and it would be much more warmly appreciated by the public. It is to be hoped that, as the Chicago press bureau conjectures, the action now taken by the roads "is but the beginning of the end, and that eventually the sale of mileage books will be entirely abolished in the territory east of Chicago."

Another wail from Chicago is based on the conclusion, evidently well settled in somebody's mind, that the iron hand aforesaid is "throttling" all legitimate competition in passenger facilities. The road that wishes to shorten the time of a through train between Chicago and New York an hour or two will not be allowed to do so, and the progress of civilization will be arrested. There is not the slightest evidence, or even ground for suspicion, that the agreement of the roads has had or will have any effect whatever in this direction. We do not believe that any road, howsoever public spirited, wishes to quicken the speed of its trains. The whole of the through passenger traffic between New York and Chicago is very small. It used to be less than one trainload each way daily (when there were 10 or 12 trains) and the proportion is not greatly different now. As long as both roads, the New York Central and the Pennsylvania, run only two 25-hour trains between them, there is not much ground for believing that either receives enough profit from its fastest trains to wish to increase the speed or to add to their number. All competent judges agree that the rates on the fast and costly trains are too low, as compared with the prices for other railroad service; but even if this were not so, if we assume that the railroads are keeping up rates because they are too lazy to wish to increase their business, the fault cannot be laid at the door of the new Association, for the fares and speeds on the roads running fast trains have been well regulated for many years past. The old associations were as effective in this respect as the new one. The Vanderbilt lines took off their 19-hour train very quickly when the World's Fair was over, and some railroad men think that they lost money by that experiment. The fact is that there are only a few men who need to go from New York to Chicago, or vice versa, in 19 hours. And if you cannot save a whole business day there is little incentive to save part of a day. A 28-hour train is about as convenient as one running through in 23 hours.

Gross earnings for February as compiled by the *Chronicle* were more favorable than for any other month of the year. The gain was 13.52 per cent.; in January it was 10.99. Of the 128 roads reported only 24 show losses. Two roads show gains of over $300,000, viz., the St. Paul and the Canadian Pacific; five show gains of over $200,000, viz., the Great Northern, New York Central, Louisville & Nashville, Southern Pacific and the Southern; six gained more than $100,000, viz., the Norfolk & Western, the Illinois Central, the Chicago Great Western, the Chesapeake & Ohio, the Missouri, Kansas & Texas and the Rock Island. Eighteen gained more than $30,000. Only one, the Brooklyn Elevated, lost more than $30,000. The most important single influence was the greater movement of grain, and hence the Northwestern roads make a better showing than any other group. The total receipts of cereals at the Western primary markets for four weeks were 33,538,869 bushels, against 20,128,251 in 1895. At Chicago the February receipts were 15,406,000 bushels, compared with 8,171,000 in 1895. Then almost 7,000,000 bushels of oats were received and over 5,000,000 bushels of corn.

The Report on the Nicaragua Canal.

We attempted last week to state as briefly as practicable the chief particulars in which the Nicaragua Canal Company has failed to collect information sufficient to enable anybody to make even an approximate estimate of the cost of the canal or to warrant anybody investing any money in it. That article was a quite inadequate review of a portion of the most excellent report made to the President of the United States by the Board of Engineers appointed to study the subject. That review carried us as far west as the Ochoa dam, covering 32 miles out of the total of 170. We shall now endeavor to give a similar summary for the remaining portion of the canal, but in this article, as in the previous one, we shall confine ourselves simply to one point—the insufficiency of the information heretofore collected. We do not attempt now any synopsis of the Board's careful examination of the works proposed or of the recommended changes.

After passing the Ochoa dam the canal follows the San Juan River to Lake Nicaragua. This stretch of the river is considered by the Board to be 69 miles long. This is from the survey made by Commander Lull in 1873. The present canal company calls this distance 65½ miles, but as no survey has been made later than Lull's his estimate is accepted by the Board. The authority upon which the company has reduced the distance is not given.

For at least 27 miles of this river section almost continuous excavation will be required. "The materials to be removed are supposed to be rock, boulders, gravel, clay, sand and mud in unknown proportions and practically unknown amounts." The company proposes to make the channel through these obstructions 28 ft. deep, with a bottom width of 125 ft. and with a slope through the material that can be dredged of three to one. The Board, for excellent reasons, would give this portion of the canal the full depth of 30 ft. and a bottom width of 250 ft., broadening in the curves to 300 ft. and 400 ft. This increased width is deduced from actual experience on the great inland waterways of our own country; but there is no way of ascertaining, with any approximation to accuracy, the quantities of materials to be excavated or their proportions. The canal company has made no surveys or examinations of this 69 miles of river except a partial survey by compass which was laid aside as valueless.

The company's estimates of excavation are 398,613 cu. yds. of rock, 422,540 cu. yds. of earth above water, and 2,150,900 cu. yds. of dredging. But a computation of the quantities indicated on the profile of the company, with the company's cross-sections, makes the rock excavation 1,424,000 cu. yds., and the dredging 3,464,000 cu. yds. No explanation of the discrepancy in the company's estimates is given, other than the suggestion that an erroneous profile must have been used, of which there is no note among the company's records. But using this same profile with the 30 ft. depth and the 250 ft. bottom width recommended by the Board, the quantity of rock would be 3,754,000 cu. yds., and of dredged material 8,526,000. But even these figures have "no valid basis, as the profile furnished by the company is little more than guesswork." And yet the chief engineer officially states that "local surveys have been made in the river San Juan at all places where the data on hand were deemed insufficient for a close estimate." We may well agree with the Board that "the omission of the company to determine the facts seems inexplicable." There are several bends in the river which would require straightening by cutting off projecting points. The company's estimates contain an item of 422,540 cu. yds. for this purpose, but in the absence of data of any value the Board has increased this estimate to 1,500,000 cu. yds.

We shall next consider Lake Nicaragua. The company's map gives the 30 ft. contour line at 14 miles off shore, and it is proposed to dredge a channel 30 ft. deep and 150 ft. wide on the bottom with side slopes of three to one, for this 14 miles. The company estimated the amount of dredging here as 4.726,076 cu. yds.; but here again is an error, for the amount of material to be removed would be 5,645,000 cu. yds. according to the company's profile or 5,143,000 according to the company's chart. It is astonishing how uniformly these errors in computation are found on one side of the account.

But for reasons that would be obvious to any navigator of experience in inland waters, the Board would increase the bottom width of the lake channel to 300 ft., and for reasons that seem thoroughly sound it would make the slope 10 to 1. This would give 12,300,000 cu. yds. of material to be dredged, still using the company's profile and chart.

At La Flor, 3.8 miles from the Pacific terminus and 13.9 miles from Lake Nicaragua, the company proposes to erect a dam, and this dam is, according to the Board, a "much more formidable construction than that proposed at Ochoa in regard both to its volume and the head of water it has to sustain." This head would be fully 90 ft. Naturally, a dam to sustain such a head of water and to protect the valley and city below must stand on a reliable foundation. Here it seems that diamond drill borings, 26 in number, have actually been made, but "with very discouraging results." One of these was carried 338 ft. below the surface of the ground without having encountered any solid material. If the material at the site of this dam is as the borings indicate it to be, the dam is, in the opinion of the Board, impracticable. Nevertheless, the company is unwilling to abandon this part of the plan and hopes that additional borings may be more favorable.

Considerably to the eastward of this proposed dam is a stretch of six miles covering the west divide, which is principally volcanic rock. There borings have been taken with a diamond drill at intervals of about 1,000 ft. through the heaviest work. The cores obtained by these borings would have been valuable if preserved; only a few of them, however, are now to be had. Cores left on the ground where fragments are still to be found show much disintegration. Con-

sidering the nature of the rock, it seems probable that the slopes proposed cannot be maintained, and that consequently the amount of excavation will be greater than has been estimated. But here again the absence of definite information prevents any close estimate.

The company has assumed that all of the locks of the western division would be founded on rock. Borings made in 1892 at the site of the tide lock show a deposit of mud of unknown depth extending at least 37 ft. below lock bottom. At the site of the second lock from the lake no borings have been taken except with an earth auger, and the existence of rock at the elevation reported is doubtful.

Finally, the Brito Harbor is considered. Here a great deal of work must be done. The latest estimate of the company puts the cost of the harbor at $1,720,000, but obviously this estimate is entirely worthless. "The information available is not sufficient to permit plans and estimates to be made. The borings made by the company are too few in number and of too little penetration to determine the underlying materials within the harbor limits. None of these reached the projected bottom of the harbor, and the actual distribution of materials and the extent of necessary rock excavation are not known." But still other information is needed before a satisfactory project for the harbor can be made. The hydrographic surveys are most meager. Moreover, gagings have never been made of the Rio Grande to ascertain whether the river can be allowed to discharge through the harbor.

We have thus covered briefly the one point which we set out to consider, namely, the quantity and quality of information on which the Nicaragua Canal Company has based its estimates, and with which it has gone before Congress with the request that its bonds be guaranteed to the extent of $100,000,000. There can be no doubt whatever as to the facts which we have recited in these two articles. We have simply told, without any exaggeration, what a thoroughly responsible and able Board of disinterested engineers has found. Indeed, we have understated this side of the matter; nobody can appreciate the case without reading carefully the details of the report. We may take the report up in another article and give some account of the criticism of the company's plans which the Board has made and which is wonderfully interesting reading, but for the present we confine ourselves to calling attention to the fact that the whole project, so far as its engineering goes, is based upon a very slender body of information and misinformation—mostly misinformation.

The Consolidated Railroad Problem in Southern New England.

What is likely to be within a comparatively brief time an essential merger of the New England Railroad with the "Consolidated" railroad system affords a timely text both for the review of the amazingly swift progress of consolidation of the lines of lower New England and of certain interesting features of the policy of the great corporation in which so many lines have been absorbed.

The Connecticut Railroad Commission Report for 1876 gives the names of 18 railroad corporations for which separate and full returns had been sent in. In 1891 those corporations had diminished to 10. In the last commission report they had fallen to six and of those, two are under the control of the Consolidated Company, two others are controlled by outside companies, and one short road is, in essence, a private line. As the two roads first referred to (the New England and the Shepaug, Litchfield & Northern) are destined to formal union with the Consolidated Company, the next commission report may contain full returns on its schedules from but four steam railroad corporations in the state.

But even these impressive figures only partly measure either the speed of consolidation in the region or its dimensions. Since early in 1892 the Consolidated Company has taken in the Stonington, the Old Colony and the Housatonic systems—these three alone more than doubling its previous mileage—and during the past year it has assumed control of the only competitive system left in Southern New England, that of the New England Railroad Company. Along with these latest acquisitions have gone all the large boat lines of the Sound; so that the company may be described, in a martial sense, as fortified on shore and covered by a navy on the sea.

The figures for gross receipts which, perhaps, best measure the growth of the corporation, are becoming impressive both in absolute size and in increment. They were $11,903,107 in 1891; $12,499,737 in 1892; $18,737,355 in 1893; $26,088,006 in 1894, and $28,539,199 in 1895. The receipts thus far this year indicate a total for 1896 of not less than $30,000,000, probably considerably more, and if we add New England and boat line earnings, not heretofore reckoned in as gross, the total earnings for 1896 of the great corporation will probably rise to almost $40,000,000, and place it a good fourth in rank among the railroad systems of the country, following the Pennsylvania, the New York Central and the Atchison. Or, taking a different fiscal test, the Consolidated Company owned or controlled in 1890 properties with outstanding securities worth, at market prices, about $50,000,000, while the corresponding figures to-day are somewhat more than $200,000,000.

Simultaneously with the rapid absorption of railroad properties during recent years by the Consolidated Company and, indeed, as part of that process, there has been a great increase of capital stock and debt. In 1889 the capital stock was but $15,500,000; in October of that year it was increased by $3,100,000; in October of 1891 by $4,675,000; and in October of last year by $9,500,000, all these issues being made to the stockholders at par as well as $13,150,000 of four per cent. debentures convertible into stock in 1903 to which about $3,300,000 was added last October. As a result of these additions, together with some stock sold and 146,679 shares issued for stocks of companies merged, the present capital stock amounts to $47,500,000 and the debenture debt to about $16,450,000. During a period of a little more than five years, excluding stocks exchanged for other stocks and also excluding expenditures on the Old Colony Division, the company has spent cash (derived from stock and bond issues) amounting to about $34,000,000, or just about double its total capital and bonded debt in 1889.

The cash derived from these issues has been largely used in the immense task of four-tracking the New York division, the removal of grade crossings, and the purchase of real estate—especially at or near the Harlem terminal—the buying of steamboat stocks, and other purposes. It is now stated that money must be raised for continued improvements estimated at from $12,000,000 to $16,000,000, of which about one-third will be used west of New London, and most of the rest on the Old Colony division, including the terminal improvements at Boston, which will cost several millions at least.

It is questionable whether the annals of railroading supply an example of so vast a series of changes evolved by one company during so brief a time, and still far from ended—new and large systems to be reorganized under fresh conditions, fiscal problems to be met, a huge scheme of improvements in progress, trolley competition as a novel and incidental factor, and all these burdens, which railroad companies are usually willing to endure only one at a time, assumed collectively by the Consolidated Company, and in many cases voluntarily. The outcome of such a rushing policy we cannot pretend to forecast here, and we can only try to point out some of its positive and negative elements.

It can be stated on the positive and favorable side that not a few of the costly improvements made or to be made by the Consolidated Company were ordered under the laws of the states through which it passes and thus became imperative; that in Massachusetts the improvements have been pressed to take advantage of the limited statute under which the state bears 45 per cent. of the cost of abolishing grade crossings; that many of them, such as the four-tracking, the Harlem terminal expansions, real estate bought elsewhere and large additions to equipment, have added instantly to earning power and are partly reflected in the wonderful increase of freight business, which showed a gain in gross of about $1,800,000 in 1895 over 1894 and for the seven months past shows an increase of $1,037,149 over 1895; that the rapid improvements are in the line of public interest and minimize, if not check, the outcry against "monopoly"; that the great increase of financial liabilities has been considerably offset by stocks and bonds purchased in which full or greater value has been received; that great surplus earnings have been "plowed in" for many years past and present earnings still show a surplus over the 8 per cent. dividend; that the traffic agreements with the westward lines feeding freight at the Harlem terminal, as well as the new adjustments with the New York Central and the Boston & Albany, promise additions to net earnings; that the company now owns the territory of Southern New England, with its fast-growing cities, almost in fee simple; that extended economies are possible in the consolidation of service, and that the corporation, if ever put to it, has potency for direct economies on an expansive scale; that refunds of old high rate bonds will save the company annual fixed charges of some $250,000 during the coming ten years, while at the end of nine years the refund of the New England first mortgage will save $260,000 a year more; and finally, that the unquestioned integrity of the corporation officers safeguards the interests of the stockholders against fraud, while the wide dispersion of the stock protects it against speculation.

On the negative side the arguments are perhaps more generalized, but not less forceful. Hurried construction in many directions at once and on broad plans often means extravagance and waste in habit and in fact. Many of the four-tracking improvements of the Consolidated Company, especially in the masonry work, are of an ornate character which argue profuse spending. A very large proportion of the improvements also are of a kind which add little or nothing to earning power or add earning power very remotely. What also may be called in medical phrase a hyperesthesia of railroad improvement causes obscurity and disparities in accounts, exhibited, for example, by the change of a surplus of $1,788,000 for dividends in the Consolidated's October quarter into a surplus of but $113,000 for the past quarter, both quarters also showing exceptional disparity with the previous year. Again, while improvements may still the public cry against monopoly, they whet the public demand for new improvements. What Norwalk and Stamford or Providence or Boston are getting to-day, Taunton and Fall River and New Bedford may demand to-morrow until endless vistas of "improvements" open ahead, as when one turns the telescope on the star depths of the milky way. With the tough New England meat yet to be digested, with sixteen and a half millions of debentures to be converted into stock seven years hence, and with the trolley rivalry pressing hard, a conservative policy has also its general force along with the suggestion that earnings are a flexible quantity while fixed charges are not, and reduced dividends are not a solace. The stories of Reading and of the Baltimore & Ohio may be cited, too, as examples of the quick wreck of once conservative railroad properties by outlays premature and lavish. Some singular incongruities of the Consolidated policy may also be noted, such as opposition to new bonds on its lightly bonded old system, while it buys New England bonds for reissue; and its purchase of Connecticut branch line stock, while it issues under its guarantee fresh Old Colony stock in Massachusetts. Finally, we may hear, ere long, the stockholders of the prosperous old corporation complain that their property isn't the purse of Fortunatus, that the brawniest swimmer sinks if too long or too far in deep water, and that their own discomfort under so radical a railroad policy may be sentimental, but is something.

We offer these two lines of optimistic and pessimistic reasoning, leaving it to the seven thousand stockholders of the Consolidated Company to find the golden mean of prophecy if they can. Meanwhile so vast a plan to forestall the future as that which the Consolidated Company is now unfolding has its exceptional interest in the general problem of railroad policy, not diminished by the fact that the Boston & Albany, the "Chicago & Alton of New England," lies so near its southern rival that what seems to many radicalism on the one hand and what certainly is conservatism on the other, may both be studied on the same screen.

Northern Pacific Affairs.

A peculiar fatality seems to follow the affairs of the Northern Pacific Railroad. From the very first this big system has offered the most perplexing problems to financiers of any of our numerous insolvent railroad properties. Five conflicting interests have fought for a foothold from the instant of the receivership in August, 1893; the two leading factions, the Ives party controlling the officers, and the Adams committee on the side of the original receivers, have carried on a fight, which in its bitter, prolonged and uncompromising character has few rivals in recent financial annals. For two years and a half this contest has been in progress, with the advantage now on one side and now on the other, with liberal charges of gross mismanagement directed against the former directors of the road, which were never actually proved, but never quite disbelieved, with an infinity of minor lawsuits, conflicting decrees, and bondholders' committees, and with all the elements of an unrivaled financial confusion.

All this would seem like a bad enough tangle, but it was simplicity itself to what has followed in the quarrel of the various circuit courts over the control of the helpless property. With the exception of Judge Lacombe in New York, who has followed a waiting policy throughout, each circuit court with any claim to jurisdiction over any portion of the track of the Northern Pacific, has asserted its majesty in defiance of its neighbors. The original receivers, whom Judge Jenkins of the Seventh (Wisconsin) Circuit had appointed in 1893, resigned in October of last year. Successors were appointed, but the Washington Circuit Court refused to recognize them and

appointed its own nominee. The result was a reductio ad absurdum of the system of dismembering a big property by the creation of a multitude of divisional receivers; and on the face of the matter there was nothing that could be done. The courts, to whom all parties concerned had a right to look for help in straightening matters out, were doing their best to make the trouble worse.

Under the stress of this situation the conflicting interests were driven into a temporary harmony for the sake of self-preservation, and, under the advice of counsel, they tried a combined move which was a wholly new experiment. They took the whole matter before the Justices of the Supreme Court, who control ultimately the circuits which include the property of the road, and asked them to bring some order out of the existing chaos. The Justices acted very promptly and within a week issued their order to the quarrelling circuit courts that Judge Jenkins should have primary jurisdiction over the whole property. Of course this order was only advisory, indicating exactly what action the final source of authority would take if the case should actually come before them in due course. This action was a new move and offered not only a solution of the present trouble but a capital precedent as well for future cases of the same sort. The order was plain and emphatic, and for a few weeks everything ran smoothly. Judge Jenkins appointed receivers for the whole property; the financial interests had reached a compromise by their previous concerted action; New York financial houses were in readiness to take charge of affairs and apparently waited only for the right condition of the market to bring out a plan of reorganization. But ill luck had not finished with the Northern Pacific.

The two judges of the Washington Circuit have issued what amounts to a proclamation of their independence, and insist upon keeping their own receiver; in other words they hold to their former course though in their printed order they say a good deal about still regarding the Wisconsin Circuit as the court of first jurisdiction. Such action is surprising enough and as unfortunate as could well have been devised. The plain intent of the Justices of the Supreme Court had been made known in unequivocal terms and it seemed as if all that these judges of the circuit could do would be to follow their lead. But, with all the wearied, long-suffering financial interests looking to them to retract in a speedy, straight-forward manner, these judges have deliberately taken an action which for the moment blocks progress. Of course the order of the five justices indicates beforehand that this action would not stand upon appeal.

Since the above words were written the plan for the reorganization of the Northern Pacific has been made public, and now the moral obligation upon the circuit judges to get together and work harmoniously to aid the settlement becomes, if possible, still more imperative. An abstract of this plan appears in our column of General Railroad News. It will be observed that this plan bears hard upon the stockholders. The holders of the preferred stock are called on to pay an assessment of $10 a share, of the common stock $15 a share. Then the preferred stockholders receive 50 per cent. of the new preferred and 50 per cent. of the new common. The holders of the present general first mortgage bonds receive 3 per cent. in cash, and new prior lien bonds to the extent of 135 per cent. of their present holding. Their interest, however, is reduced from 6 to 4 per cent. The holders of the present second mortgage bonds get 4 per cent. in cash, 118½ per cent. new prior lien bonds and 50 per cent. preferred stock. Their interest is reduced from 6 to 4 per cent. The third mortgage bondholders get 3 per cent. in cash, 118½ per cent. of the new general lien bonds and 50 per cent. preferred stock, and their interest is reduced from 6 to 3 per cent. The consolidated mortgage bondholders get 1½ per cent. cash, 66½ per cent. in general lien bonds and 62½ per cent. preferred stock, and their interest is diminished from 5 to 3 per cent. Although the burden of the reorganization falls heavily upon the stockholders, we are bound to think that the policy is a correct one, for if the stockholders are not responsible for the mismanagement which has brought their property to its present deplorable condition, who is? The property now belongs to the creditors, and the debtors, the stockholders, must make the best terms that they can.

The Oregon Short Line Reorganization.

The Reorganization Committee's plan for the Oregon Short Sine system is at last in the hands of the public. Although the plan is but just published it is generally accepted as a final and satisfactory compromise between the various conflicting interests concerned in the property. Since the receivership in September, 1894, there has been a vigorous fight over the finances of the system and the victory has rested mainly with the consolidated mortgage bondholders, who have been pushing foreclosure proceedings since July, 1895. The Oregon Short Line system was formed by a consolidation in 1889 and has since been controlled by the Union Pacific, which has operated it under a traffic agreement. As a result, the Receivers of the latter road have acted as Receivers of the former, which was not in itself to be desired, but was the only alternative, as the various bondholders' committees could not agree on a separate Receiver. In December of last year these conflicting committees were merged in a new consolidated mortgage committee, representing all sides in the property, and the result of their work is the present plan. We give a brief abstract of its main features.

The securities of the new system are to be as follows:

1. Consolidated first mortgage 5 per cent. 50-year bonds	$36,500,000
2. Non-cumulative income bonds, Series "A" (5 per cent)	7,185,000
Non-cumulative income bonds, Series "B" (4 per cent)	14,841,000
3. Common stock	27,460,100

The adjustment of the new with the old securities is to be made along the following lines:

A. The following old underlying divisional mortgages are to be undisturbed, being replaced dollar for dollar by the new consols as the old securities mature.

Oregon Short Line, First 6's	$14,931,000
Utah & Northern, First 7's	4,993,000
Utah & Northern, Consol 5's	1,831,000
Total undisturbed	$21,755,000

B. The old consols and the Utah Southern mortgages are to be exchanged for 50 per cent. new consols, 50 per cent. new income series "A," and 100 per cent. common stock (to represent accrued interest).

C. The collateral trust bonds (having an interest in Oregon Railway and Navigation Co. stock) are to receive par value in the Series "B" income bonds. Provision is also made for assessments on the O. Ry. & N. Co. stock.

D. The stock is assessed $12 a share, and will receive 50 per cent. in new common stock, and the amount of the cash assessment in new consols.

The reorganization bears thus very heavily on the holders of the old common stock, but this was inevitable. The fixed charges of the new property will be only $1,853,270, as against $2,788,575 on the property as it stands now. The net earnings for the last three years previous to 1896 are given below:

	Net earnings.		
1893....	$2,078,395.	Leaving, after deducting fixed charges—deficit	$238,356
1894....	1,151,447.	Leaving, after deducting fixed charges—deficit	1,553,731
1895....	2,273,164.	Leaving, after deducting fixed charges—deficit	515,411

The average income for the last six years, taking very bad times and very good times together, has been $2,374,430 which leaves quite a surplus over the estimated fixed charges to go to the new income bonds. The value of the new stock, however, is evidently somewhat mythical. The last important item is the immediate cash requirement of the property, which is rather roughly estimated at $4,701,624, and is just about covered by the money now in the Receiver's hands added to the 12 per cent. assessment on the present common stock.

All securities must be deposited by April 15, 1896, in order to participate in the reorganization under the plan.

Legislation on matters affecting railroads is proposed this year, in the customary voluminous quantities, in all the states where the legislatures are in session, but there seems to be less than the usual variety. One of the bills which makes the most noise is that which proposes to compel the transportation of bicycles on passenger trains without charge. No definite action has been taken in any state as yet, but in New York the friends of the bill have presented a petition signed with 30,000 names. The most important piece of legislation reported during the week, if we may judge by the length of the bill, is the proposition of Congressman Curtis, of Kansas, to "regulate rates on agricultural products," meaning corn from Kansas to the Gulf of Mexico. The bill fills a column of fine print. We have not had time to read it, but as it has been drawn, so the Kansas people tell us, by Chairman Morrison, of the Interstate Commerce Commission, we feel safe in saying that it proposes to give the Commission more effectual power in compelling the railroads to make rates which will please the shippers. The bill which has raised the most discussion in Congress is that of Representative Loud, of California, who proposes to prohibit the transportation of Government supplies in the mails. Merchandise of all sorts is sent from Washington to the most distant parts of the country by mail, and the chief of the department making the shipment has the satisfaction of seeing the charge for the expense of transportation borne by the post office department instead of by his own. It is said that the exhibits of the Government at Chicago, in 1893, and Atlanta last year went by mail. The transportation of $20,000,000 in gold by mail from San Francisco to New York, two or three years ago, will be recalled. At the hearing the officials of the post office department were accused of holding these heavy shipments out of the mails during the 30-day period in which the weights are recorded for the purpose of computing the rate which the Government is to pay the railroads for transportation for the usual four-year term. The regular appropriation bill for the post office department was the subject of the usual discussion in Congress this year. The appropriation of about $200,000 for special speed and facilities on the line between Boston and New Orleans was put into the bill, then taken out and finally restored again, and at last accounts $81,000 was included for fast service between Kanses City, Mo., and Newton, Kan. A bill has been introduced in Congress to reduce the fares on the Missouri, Kansas & Texas in Indian Territory from 5 cents a mile to 3 cents. In South Carolina the passenger fare reduction has been enacted into law, and the Legislature has adjourned. A press dispatch states that first-class fares have been fixed at 3¼ cents a mile throughout the state. The rates hitherto in force were 3½ and 4 cents.

The Railroad Committee of the New York Assembly will report favorably the following bills: Mr. Stewart's, compelling the New York Central to run trains through in the morning (in connection with the Manhattan) from Yonkers to Rector street, New York City, and in the evening from Rector street to Yonkers; Mr. Carlisle's, compelling the issuance of family tickets at 1⅜ cents a mile on railroads which declare 8 per cent. dividends and have a terminus in New York City, Brooklyn or Buffalo; Mr. Nixon's, compelling street surface railroads, before the construction of their roads, to obtain the assent of the Railroad Commission to the amount of the capital stock stated in the certificate of incorporation; Mr. Bondy's, compelling steam railroads to establish pension funds for employees who are injured in accidents, or the families of employees who have been killed in service.

The Oregon Railway & Navigation Company has made the reduction in its tariffs on wheat from Eastern Washington to Portland, Or., as directed by the order of the Interstate Commission, which was reported in the *Railroad Gazette* of Feb. 28. The rates were reduced somewhat by the road after the complaint was made to the Interstate Commerce Commission and before it was settled, so that the reduction finally ordered was very small; that is, from 21¼ cents per 100 lbs. to 20 cents from Dayton and to 19½ cents from Walla Walla. From the full report of the Interstate Commerce Commission on this case, which was prepared by Commissioner Yeomans, it appears that the railroads carrying grain to Portland have been in the habit of paying to certain elevator companies a large commission on shipments of wheat from the interior. This practice and the fact that the value of wheat has declined during the past eight years much faster than railroad rates have been reduced, seem to have constituted the main reason why the reduction was ordered by the Commission. The condition of the grain traffic in Washington and Oregon, as well as the financial status of the Oregon Railway and Navigation Company, is set forth in the report in great detail, filling about 20 pages, but the connection between these conditions and the degree of modification ordered in the rates is mostly left for the reader to figure out for himself.

TRADE CATALOGUES.

Instruments of Precision, for Civil Engineers, Surveyors and Astronomers. Brooklyn, N.Y.: F. E. Brandis, Sons & Co. 12th edition. Price, 50 cents.

This catalogue of the various instruments used by civil engineers, surveyors, astronomers, etc., has a class of material in it not usually found in a trade publication. One hundred and sixteen pages of the book are devoted to a treatment of the various instruments and their uses, information being given concerning the care of instruments, their manufacture, use, adjustments, etc. A chapter is devoted to the telemeter, giving formulæ and tables, which latter are for use both with the telemeter and the gradienter. Following this is a chapter on the gradienter. A chapter on the theory, use and adjustment of the solar attachment for transits contains much useful information, rules for finding the meridian being given. The use and adjustment of the level, the use of the plane table and its adjustment, the use and adjustment of the sextant, the current meter and the station pointer, follow. Refracting and equatorial telescopes, microscopes, micrometers, altitude and azimuth instruments, and the aneroid barometer, are next in order, the latter being treated in a chapter of 13 pages, with complete tables and formulæ. Bessel's tables of refraction are also given. Fifteen pages are devoted to transition curves, with necessary formulæ and tables.

The descriptive price list composing the second part of the book contains illustrations of a large variety of transits, levels and theodolites for all classes of work, as well as equatorial telescopes and other astronomical instruments. The remaining pages cover a wide variety of instruments, including sextants, current meters, barometers, planimeters, field glasses, tripods, rods, etc.

Cattle Guards.—The Bush Cattle Guard Company, of Kalamazoo, Mich., has issued its fifth annual catalogue. We are informed that there are now over 16,000 of these guards in use and that one railroad alone has over 2,400 of them and is still one of the best customers of the company. This cattle guard is all steel and is built without bolts or rivets. It is made of T steel, turned upside down and supported on pressed-steel inverted troughs. A new form is brought out this year in which each alternate rail has the top of the web slashed and points turned out, these points being so placed as to face toward stock approaching the guard. The catalogue contains a synopsis of court decisions in the matter of cattle guards, establishing their legal status.

Water-Proof Manilla Roofing.—The Fay Manilla Roofing Co., of 516 Point street, Camden, N. J., has issued a pamphlet calling attention to its water-proof manilla roofing for freight cars, roundhouses, train sheds, lining refrigerator cars and cold storage warehouses. It has been in use for about three years on the Chicago, St. Paul, Minneapolis & Omaha, about 500 cars having been roofed with the water-proof manilla paper, used between the roofing boards. It is claimed for this form of roof that it is water-proof without paint, is easily and quickly applied, is a non-conductor, is light, does not deteriorate, etc.

The Winter's Experience on the Lenox Avenue Conduit Road.

The underground road which the General Electric Company installed on Lenox avenue, New York, has emerged successfully from the tests to which the severe snowstorms of the month have subjected it. During the violent snowstorm of March 11 the operation of the road did not cease for an instant. The snow began to fall about eight o'clock in the morning and the snow sweeper was started over the line, but before it could make the complete trip the sprocket wheels of the broom broke and it was necessary to push the sweeper back into the barn for repairs. Not until four o'clock in the afternoon was it ready to go out on the tracks again. Meanwhile the service of the road was conducted without any stoppage, and the cars ran over the unswept tracks with no greater delay than would be ordinarily caused by considerable slipping of the car wheels on the snow covered rails; it took about eight or ten minutes longer to make the trip. At some points on the line the snow was swept by the wind into drifts, making it necessary for the motorman to back his car to get the necessary momentum to push his vehicle through the drifted snow. At 4 o'clock the snow sweeper cleared the line of the snow, and regular schedule time was again resumed. About 8 o'clock the storm turned to sleet and hail, and as it fell covered the rails with ice. Notwithstanding this the cars ran at their usual intervals.

On the Lexington avenue electric conduit road a gang of men swept the tracks, and on this line the cars made schedule time while the bad weather prevailed. Throughout the duration of the storm no electrical trouble of any kind was developed either in the conduit or in the cars.

The rolling stock of the electric conduit lines of the Metropolitan Traction Co. is now undergoing a large increase. Equipment has been started on a number of new cars, and they will be put into service as soon as they are ready.

TECHNICAL.

Manufacturing and Business.

The Garlock Packing Co. reports a large increase in business during the past few months, necessitating running its factories overtime. On account of the steady increase of the demand for the various packings made by the company, it is erecting a large addition to the buildings at Palmyra, N. Y.

McIntosh, Hemphill & Co., iron and steel manufacturers, of Pittsburgh, are reported to be largely interested in a company which will include Pittsburgh and New York interests, now being formed, to erect a plant at Pittsburgh for manufacturing car trucks. A site for the shops along the Allegheny River and reached by the Allegheny River Railroad, was purchased last week at about $60,000. It is said that the buildings and machinery for the new plant will cost about $300,000.

Press reports say that the Carnegie and Bethlehem armor-making companies have stated that, upon prompt submission of plans and specifications, they will enter into contracts with the Government to make the armor for six battleships in 28 months, accepting the imposition of penalties in case of failure.

The Berlin Iron Bridge Co. reports some very large contracts on hand which will keep its entire plant running with a full force of men for some time. The more important orders, other than bridge contracts, are a forge shop for Pratt & Whitney, of Hartford, Conn.; a machine shop for the Granger Foundry & Machine Co., of Providence; a car shed for the Third Avenue Street Railroad in New York City; a car-house, engine-room and boiler-house for an electric road at Fort Lee, N. J.; a steel tube plant and other buildings for the Pope Manufacturing Co., of Hartford, Conn.; an electric power-house at Hackensack, N. J.; foundry building at Watertown, N. Y.; three large buildings for the Standard Oil Co, at Constable Hook, N. J., and a casting shop and machine shop for Randolph & Clowes, at Waterbury, Conn.

The Chicago Pneumatic Tool Co. received last week another order from London for ten hammers of the "B" size, used for general boiler work; for a Star hammer, used for riveting staybolts and other light riveting; and for two Manning sand-papering machines. This makes a total of 73 hammers shipped to London since Dec. 15 last. A new catalogue, illustrating the pneumatic tools made by the company and the work they are adapted for, will be published shortly.

F. M. Pease, dealer in railroad supplies, 355 Dearborn street, Chicago, is offering for sale second-hand 20-ton flat cars, 35 ft. long for $150 each. The cars are on the Lehigh Valley road.

George L. Fowler, 53 Broadway, New York, has been appointed Selling Agent in New York for the Richmond Locomotive and Machine Works.

The Penn Bridge Company report they are running works full and will soon go on double turn. They have recently completed buildings for a gas producer for the Linden Steel Company and also for the Carbon Steel Company, of Pittsburgh, the latter building being 300 ft. long; also a warehouse for the Union Iron & Steel Company, Youngstown, O., 300 ft. × 80 ft.; also an addition to the rolling mill building of the Pittsburgh Reduction Company at New Kensington, Pa. They are ready to begin erecting a new building at the lower works of the Pittsburgh Reduction Company at Niagara Falls, and also a large rolling mill building for Messrs. Hubbard & Company, at the site of their works recently burned, Pittsburgh. New works for the Keystone Axle Company at Morada, Pa., 200 ft. × 80 ft. will also soon be begun.

This company also reports contracts for a number of small bridges in Newton County, Ind.; Lavaca and Harris counties, Texas, and Jefferson County, Wis.; and for a 170-ft. drawbridge across Vermillion River, at Abbeville, La. The work is well under way for the suspension bridge across the Ohio at Rochester, 2,200 ft. long, with a channel span of 800 ft., and for a similar bridge at East Liverpool, O., 1,600 ft. in length, with a channel span of 750 ft.

The New York Equipment Company, of 80 Broadway, N. Y., is just completing buildings at Dunkirk, Ind., for a large locomotive and car repair shop, and is now in the market for the steam plant and the iron and wood-working machinery requisite for such a shop. The plant will be a large and complete one, and the machinery contracts will be for a large sum.

The annual election of the Directors of the St. Charles Car Company, held last week, resulted as follows: W. H. Glasgow, W. H. Thompson, W. H. Markham, H. B. Denker, H. Elliot, H Koester and Frank Becker. The Directors re elected the present officers as follows: President, W. H. Glasgow: Vice President and General Manager, H. B. Denker; Secretary and Treasurer, Alph Aymond. A dividend of 6 per cent. was declared.

Iron and Steel.

An iron furnace at Paducah, Ky., was sold March 8 at public auction to E. C. Lackland, of St. Louis, for $47,000, by order of the United States Court, to satisfy a mortgage of $70,000 held by St. Louis men.

Reports from Chicago say that business in steel rods has been brisk, with sales of 8,000 tons at about $27, and an aggregate of upward of 25,000 tons for the past two weeks, with other contracts to be placed this week. Steel rails are also very active, with demands for large sales. Pig iron, outside of several 1,000-ton lots, has been dull for Northern as well as Southern producers.

The Frank C. Patton Company, of Sycamore, Ill., has become the Sycamore Foundry & Machine Company, and decreased its capital stock from $75,000 to $50,000

Furnace A, of the Maryland Steel Company, Sparrow's Point, Md., made a record recently on foreign ore, the burden being one-third Mokta, one-third Tafna, one-sixth Porman and one-sixth Seriphos ores, and the yield being 55 per cent. in pig. The best day's work was 321 tons and the best week's work 2,019 tons. The fuel consumption was 2,038 lbs. of coke per 2,240 lbs. of iron.

A project for the erection of a blast furnace of 150 tons capacity and capital of $300,000, at Harriman Tenn., is under way.

John Laloge, of Birmingham, Ala., and M. Corringo, of Houston, Texas, have formed a company with a capital of $10,000, to erect a nut and bolt works at Birmingham, Ala.

Peter Donaldson and Thomas N. McKinnon, of Glasgow, Scotland, have purchased the properties of the Dayton (Tenn.) Coal & Iron Company, consisting of two blast furnaces of 150 tons capacity each, 5,000 acres of coal lands, two mines in operation. The sale is said to be a part of a plan for reorganization.

As a result of a decision rendered March 16 by the State Supreme Court at Philadelphia, Sheriff Richards has closed the William Clark Sons & Company Solar Iron Works, on Penn avenue, Pittsburgh. The executions aggregate nearly $700,000. Of this amount bondsmen hold $175,000, creditors hold $60,000, and Mrs. E. L. Clark, who brought the suit, holds $453,000. The suits arose from an unsatisfactory division of the interests held in the property of the firm.

New Stations and Shops.

The new railroad shops which the Southern Railway is to build at Salisbury, N. C., will be larger than was at first proposed, and will include wood-working shops also. The whole plant, it is now stated, will cost $250,000. Ground was broken last week.

The Pittsburgh & Western shops in Allegheny, Pa., are now very busy on repair work for both cars and locomotives, and it is said that they have seldom been so crowded with work. Extra forces of men are working in all departments. Fourteen locomotives are in the shops being rebuilt. The car shops are also doing a good ceal of repair work.

A small repair shop is to be built at Rumford Falls, Me., by the Rumford Falls & Rangeley Lake road and a small roundhouse will be built at the same town by the Portland & Rumford Falls road, of which the former road is an extension.

The car shops of the Northern Central road at Canandaigua, Pa., are to be removed to Newark, Wayne County, N. Y.

The new Concord & Montreal shops to be built by the Boston & Maine, at Concord, N. H., recently referred to in these columns, will occupy 28 acres of land. The buildings will take up five acres and will include a boiler and erecting shop 410 × 70 ft., two machine shops 305 × 305 × 30 ft., a blacksmith shop 60 × 150 ft., a storehouse and offices 150 × 40 ft., a lumber shop 300 × 400 ft., a dry house 75 × 25 ft., a woodwork shop 300 × 60 ft., a power and boiler shop 85 × 60 ft., a cabinet, pattern and tin shop 200 × 40 ft., a passenger repair shop 163 × 170 ft., a freight repair shop 162 × 170 ft., and a paint shop 238 × 50 ft. Arrangements have been made for doubling the capacity of the shops whenever desirable. All the buildings, with the exception of the offices and storage houses, will be one story high, and, aside from the lumber shed, will be of brick. The new shops may be ready for occupancy before the opening of next winter.

A new passenger station to cost about $10,000 is to be erected at Ocala, Fla., by the Plant System. The building will be of brick about 238 ft. long and two stories high.

Another Ship Canal.

It is a great pleasure to be able to mention the fact that a private company wants to get a national charter to build a ship canal from the lakes to the sea with its own capital, and that it asks no financial help from the general government. This is in itself evidence of the good faith and serious purpose of the company. On the 12th a bill was introduced in the United States Senate by Mr. Hansbrough and in the House by Mr. Cooper, of Wisconsin, to incorporate the Maritime Canal Company of North America. The bill provides for a ship canal not less than 26 ft. deep and 300 ft. wide, from the great lakes to the Atlantic. The company proposes to go from Lake Erie to Lake Ontario, and from Lake Ontario or the St. Lawrence River to Lake Champlain, and then to tidewater in the Hudson River. The company is said to own a franchise for a ship canal from Lake Erie to the ocean, by way of Montreal, and to have spent over $200,000 in surveys and other preliminary work, and to own the patents on the Dutton pneumatic lock. The charter provides that there shall never be issued more than $200,000,000 of bonds, preferred stock and debentures, and that no more than 5 per cent shall be paid thereon; but that tolls shall be reduced so as to keep dividends and interest paid within that rate. The work is to be begun within three years and finished within ten years. The incorporators named are Luther Mendenhall, G. G. Hartley and T. W. Hugo, of Duluth; Rowland J. Wemyss and L. R. Hurd, of West Superior, Captain F. L. Vance, of Milwaukee; W. B. Dean and P. H. Kelley, of St. Paul; Henry C. Burleigh, of White Hall; Smith M. Weed, of Plattsburgh; James Andrews of Pittsburgh; Luther Allen, of Cleveland; John Birkinbine, of Philadelphia; Daniel H. Burnham, Lucius G. Fisher and Oscar D. Wetherel, of Chicago; John Bogart, C. N. Dutton, Henry B. Slaven and George S. Stover, of New York City.

A New Electrical Society.

The American Institute of Electrical Engineers was incorporated at Albany on March 16. Its principal office is in New York City, and the directors are Louis Duncan and Charles S. Bradley, of Baltimore; W. Anthony, of Dunellen, N. J.; F. B. Crocker, M. I. Pupin, J. J. Carty, W. D. Weaver, W. B. Vansize and C. T. Hutchinson, of New York City; James Hamblet, of Brooklyn; A. S. Hibbard and B. J. Arnold, of Chicago; W. F. C. Hasson, of San Francisco; H. J. Ryan, of Ithaca; Charles Hewitt, A. E. Kennelly and Carl Hering, of Philadelphia; W. J. Hammer, of Elmora, N. J.; C. F. Scott, of Pittsburgh; C. A. Hamilton and R. W. Pope, of Elizabeth, N. J.

Rowell-Potter Signal at Chicago.

The Rowell-Potter block signals on the Metropolitan Elevated Railroad in Chicago, which were described in the *Railroad Gazette* of Nov. 1 last, are now in place and have been operated as visual signals for some time. In addition to the visual signal the apparatus is to be arranged to automatically apply compressed air-brakes on the trains, and this feature will soon be put in operation, the 56 motor cars of the road having been already equipped.

Lake Shipbuilding.

The steel steamship L. C. Waldo, building at Wheeler & Co.'s works at Bay City, Mich., for the Roby Transportation Company, of Detroit, is ready for launching. As soon as the ways are cleared the steel steamer for Mr. Rockefeller, recently contracted for, will be started.

Lead Coating for Iron and Steel.

The Ajax Lead Coating Co., of 46 to 52 Richmond street, Philadelphia, calls attention to its process for coating metals with lead instead of with zinc, tin and other compositions. This coating is done by immersing the metallic surfaces in a bath of molten lead. The manufacturers claim that such a coating is superior to a galvanizing of zinc, and has a wider field of application. A particular application of this coating is for sheet iron roofs, particularly for rolling mills, chemical works and all places where the roofing is exposed to gases or to sea air. Another application of the lead coating is for gas and water pipes as well as those used for alkalies, weak solutions of acids, etc. This, it is claimed, makes them as durable as lead pipe at a much less cost. The process is also applicable to smokestacks, smoke pipes for heaters,

screws, nuts, spikes, nails, chains, iron shutters, and in fact all purposes for which tinned or galvanized iron and steel is now used.

Pig Iron Production.

The *Iron Age* says that in spite of the fact that there has been considerable decline in the productive capacity of work, and of the fact that February is a short month, the stocks of pig iron, as reported, show an increase. While it is pretty clear that current consumption is not absorbing the make, it must be taken into account that we are passing through what is ordinarily the poorest season of the year.

The weekly capacity of all the furnaces on March 1 compared as follows with that of preceding periods:

	Furnaces in blast.	Capacity per week. Gross tons.
March 1 1896	207	189,583
February 1	215	198,5 9
January 1	241	207,481
D cember 1, 1895	242	216,.97
November 1	239	217,306
October 1	232	201,414
September 1	215	194,0:9
August 1	2 0	180,525
July 1	185	171,191
June 1	172	157 224

The position of stocks, sold and unsold, as reported March 1, was as follows, the same furnaces being represented as in former months:

Stocks.	Nov. 1.	Dec. 1.	Jan. 1.	Feb. 1.	Mar. 1.
Anthracite	267,591	283 604	390,943	454,717	522 894
Coke and charcoal	129 075	131,788	134 684	134,309	135,896
Totals	396,669	415,392	525,617	589 026	658,790

The stocks do not include the majority of the furnaces controlled by steel companies.

Improvements at the Bath Iron Works.

The capacity of the foundry of this company is to be doubled, and a new structure will be built of brick and steel. The main building will be 150 ft. long and 130 ft. wide. An electric traveling crane of 20 tons capacity has been ordered from the Morgan Engineering Company, of Alliance, Ohio. This crane has a span of 50 ft. It will be driven by three independent electric motors: One 16 H. P. for hoisting; one of similar horse power for longitudinal travel, and one of 8-H. P. for cross travel of trolley on bridge. Steel jib cranes will be placed in the wings of the building for handling lighter work. A new cupola will be put in and the foundry will have a reverberatory furnace of about 10 tons capacity for the manufacture of gun iron castings. The foundry will also be especially equipped for the manufacture of the Hyde manganese bronze for which the company has at present large orders both for government and outside work. The building will probably be completed in the course of three months.

Work on the Panama Canal.

The Panama *Star and Herald* says that there is great activity on the La Boca section of the canal. Three dredges are at work deepening the channel from the roadstead to the site of the proposed large wharf, which will be ready for business within a comparatively short time. A large force is constructing a breakwater around the site of this wharf (which being low ground is flooded at high tide) in order to permit the laying of the foundations for the structure. This low area is being filled up with gravel from the neighboring hills and by one of the dredges by means of a long conduit. There are in all about 1,000 men employed at La Boca. Before the end of the year small vessels will be able to come close to the wharf

Another Decision on the Van Depoele Patent.

An important decision has just been rendered by Judge Townsend, of the United States Circuit Court for the District of Connecticut, upon the Van Depoele patent No. 495,443, for the under running electric trolley system. A few months ago Judge Townsend rendered a decision sustaining the validity of this patent upon final hearing in a suit against the Winchester Avenue Railroad Company. (See *Railroad Gazette*, Dec. 13, 1895.) Shortly thereafter further infringement suits were brought in Connecticut against the Billings & Spencer Company, of Hartford, and the Kelsey Electric Railway Specialty Company, of New Haven. Judge Townsend has just decided these suits in favor of the Van Depoele patent and granted motions for preliminary injunctions. The decision is especially important because the Court holds that the supply of essential or characteristic parts of the trolley system is a contributory infringement, and will be enjoined by the courts, even though the defendants may not supply or use the patented combination or system in its entirety. The Court further held that an unlicensed maker of trolley bases could not be permitted to supply such bases even to railroads which had been originally fully equipped by the General Electric Company.

Wiring Railroad Cars.

After considerable experimenting the Interior Conduit & Insulation Co., 527 West Thirty-fourth street, New York City, has perfected a method of wiring railroad cars for electric lighting and power. The method consists of a system of insulating water-proof and electrically fire-proof tubes, which may be concealed in the framework of cars after the manner of gas pipes. These tubes are run from the roof of the car to motors, controllers and all lamp outlets in the car, making a complete insulated raceway. It is claimed that the dangerous result from exposure, over-heating or melting of wires, and the consequent liability to destruction from fire, is completely eliminated by the use of this system. The wires are accessible at all times, and in the event of a failure of any circuit from an electrical derangement, the defective wire may be withdrawn and a new one substituted without removing the woodwork or defacing the interior finish of the car. The company also manufactures insulating conduits, protected by either brass or iron armor.

Solid Floors for Bridges.

The December issue of the *Journal of the Association of Engineering Societies* contains a very valuable paper on Solid Floor Bridges by Mr. Frank C. Osborn, M. Am. Soc. C. E., member of the Civil Engineers' Club of Cleveland. The paper occupies 20 pages and is accompanied by three folding plates. The author has collected, and made brief descriptions of examples of solid bridge floors, going back as far as the Britannia bridge built in 1845. The plates show a great many examples, and altogether the article is the most complete one on this subject that we have ever seen, probably the most complete one that has ever been printed.

The New Ironworks in Hungary.

Plans for the projected new plant of the Krompach Iron Industry Company, at Krompach, Hungary, have been completed. Two large coke blast furnaces are to be erected, one to be ready for operation next autumn and the other in the spring of 1897. A new rolling mill is also to be erected for the production of bars, plates and rails.

The Snowdon Railway.

The Snowdon Railway from Llanberis to the summit of Mt. Snowdon is almost completed and an experimental trip was made recently. The ascent took one hour and twenty minutes, and the descent half an hour less. The locomotives for this line were described in the *Railroad Gazette* for Feb. 14, 1896.

A Three Years' Engine Test.

The following record of coal consumption for two Reynolds, vertical boilers and an Allis cross compound engine, 22×40×48 in. is interesting because it covers a period of three full years. It will be appreciated that the average of a year's service represents something radically different from the short tests, covering a few hours or a few days, which are frequently published. The figures below are the result of operations at the Stevens Linen Works, Webster, Mass.:

	1893.	1894.	1895.
Average I. H. P. for year.	381	393	396
H. P. hours for year	1,012,221	893,792	1,076,134
Engine coal	1,841,701 lb	1,493,213 lbs.	1,775,701 lbs.
Average coal per I. H. P. per hour for one year	1 76 lbs.	1.67 lbs.	1.65 lbs.

The engine was indicated forenoon and afternoon and the average taken for the daily record. The boilers were used exclusively for the engine, and the figures for coal include all-night banking.—*The Iron Trade Review.*

The Chignecto Marine Railroad.

The Dominion Parliament has refused to extend, for five years, the time for completing the Chignecto Marine Railroad, to be used in the transport of vessels over the isthmus of Chignecto, which connects New Brunswick and Nova Scotia, and separates the waters of the Bay of Fundy from those of Northumberland Strait and the Gulf of St. Lawrence. The high tide and engineering difficulties were considered too serious to warrant the construction of a canal, and the ship railroad was substituted. The Chignecto Marine Railway Company, Limited, was formed in 1882, and a subsidy was granted to it, the terms of which were later changed, so that the enterprise was to receive $170,602 a year, for 20 years from the time the line began operation. Work was begun, but in the autumn of 1891 was suspended when the road was about three-quarters completed. After a delay of three years, on the report of engineers sent out to examine the work, more capital was raised. The time fixed by law for the railroad being in operation expired in July, 1894, and an extension of time has now been refused. About $3,500,000 has been spent on the work.

Bids for Section 4, Boston Subway.

The bids opened March 13 for section 4 of the Boston Subway were for two classes of steel—one (A) rods and plain beams, and two B), built beams, the quantities in the order named being 200 tons and 350 tons. The bids were: New Jersey Steel & Iron Company—A, $48 per ton; B, $44.60 per ton. Passaic Rolling Mill Company—A, $45.60; B, $49. A. P. Roberts Co. Pencoyd Iron Works)—A, $50.20; B, $46. Pennsylvania Steel Company—A, $45.88; B, $51.88. Edge Moor Bridge Works, Wilmington, Del.—A, $47; B, $52. The aggregate of the several bids was as follows: New Jersey Steel & Iron Company, $25,210; Passaic Rolling Mill Company, $26,270; A. P. Roberts Company, $26,140; Pennsylvania Steel Company, $27,334; Edge Moor Bridge Works, $27,600. The bids were taken under advisement.

A Baby Rotary.

The Buffalo Street Railway Company, the Buffalo & Niagara Falls and two or three other electric railroads have had in use this winter a rotary track cleaner which, from the descriptions published, seems to be a reduced and modified copy of the Leslie rotary snow plow, long used on the mountain railroads of the Western states.

The street cleaner is the design of Mr. Geo. W. Ruggles and eight or ten of the machines have been built. As described, the "cleaner" consists of a short car with a plow at each end, so that it becomes a double header, running in either direction. It is provided with four motors, two for propelling the vehicle and two for the operation of the plows. The axis upon which the plows are fixed runs longitudinally through the center of the car and either can be thrown in or out of gear. The plow consists, first, of a wheel at the outer end of the axis, having four vanes or blades each about 4 ft. long, made of steel or iron about ⅝ in. thick. The blades are set with the lead toward the car, so that, when the revolving machine is forced into a snow bank, it throws the snow toward the next wheel. A second wheel, placed upon the same shaft a little in the rear of the first one, is of wood, with radial blades covered with sheet iron, and the whole is surrounded with a hood and deflectors, so that, when the snow is thrown back to it, the wheel, in revolving, throws the snow up and out through the hood and deflector; and this can be done to either side of the car, according to the motion, and in different directions in accordance with the arrangement of the deflectors. Mr. R. Dunning, Master Mechanic of the Buffalo Street Railway, states that the cleaner has given very good results when acting upon heavy snowdrifts. The machines have been driven into drifts at the rate of 8 or 10 miles an hour. Three or four men are required to operate each car.

Increase of the Navy.

The House Committee on Naval Affairs March 17 reached a formal agreement on the features of the appropriation bill for the next fiscal year. Four battle-ships, at $3,750 000 each, and 15 torpedo boats, five of the first class and 10 of the second class, will be recommended. The bill also provides for 1,000 additional sailors and 500 more marines. The construction of drydocks at Algiers, La.; Mare Island, Cal., and Portsmouth, N. H., is authorized at a cost of $800,000 for the former and $575 000 for each of the two latter places. Toward the armament of modern guns for auxiliary cruisers $250,000 is appropriated, and for improvements at the Washington Gun Foundry, $50,000. The torpedo station gets $60,000 and $50,000 can be drawn upon to arm and equip the Naval Militia. Seventy-five thousand dollars are allowed for public works at the New York Navy Yard. The entire amount called for by the bill is $32,050,000.

Car Shade Patents.

In January last the E. T Burrowes Co., of Portland, Me., brought suit against the Davis Car Shade Co., of the same place, for an alleged infringement of a patent and asked for a preliminary injunction to restrain the Davis Co. from using pinch handles on its curtain fixture. The hearing on the motion for preliminary injunction was concluded on March 10 and Judge Webb, of the United States Circuit Court for the District of Maine, denied the motion. L. S. Bacon, Esq., of Washington, D. C., appeared for the Burrowes Co. and S. W. Bates, of Portland, for the Davis Co.

Car Lighting on Elevated Roads.

The Assembly at Albany on March 17 passed a bill requiring the elevated railroads in New York City to use gas or electricity for lighting their cars The bill requires that the change be made in 40 per cent. of the cars the first year, 40 per cent. the second year, and in the remainder within three years of the passage of the bill.

THE SCRAP HEAP.

Notes.

The passes of the enginemen on the Seaboard Air Line are now given for six months at a time, and are limited to the divisions over which the men usually run.

Three suits for $10,000 each have been brought in the United States Court, in Kentucky, against the Chesapeake, Ohio & Southwestern, for ejecting negroes from trains.

The timber lining of the tunnel of the Louisville, Evansville & St. Louis at Georgetown, Ind., 1,300 ft. long, was burned out on March 16, and freight traffic had to be suspended.

The Wabash is to put on a fast mail train from St. Louis to Chicago and Toledo, leaving St. Louis at 3:45 a. m. It will reach Chicago at 11:30 a. m., and Toledo at 2:35 p. m. A similar train will be run westward.

A fruit train of 13 cars was recently run over the Alabama Great Southern (Queen & Crescent) from Meridian to Chattanooga, 296 miles, in 8½ hours, equal to 34.8 miles an hour. The last 40-mile stretch was traversed in 54 minutes, equal to 44.4 miles an hour.

On the Southern Pacific lines in Texas some of the passenger trains have now been fitted with gates, and the Chicago & Alton plan, of making passengers present their tickets for inspection on entering the cars, has been adopted. The plan will be extended to other trains.

In the storm of March 1 the Bangor & Aroostook Railroad had an experience somewhat like that of the New York Central, the track from Monson Junction to Greenville, Me., 22 miles, having been inundated and then frozen over, so that it took about five days to make the track passable. The Phillips & Rangeley Railroad was blocked in the same way.

A press dispatch reports that, after a legal fight of nearly four years, between the city of Cairo and the Illinois Central Railroad, in which it was sought to compel the railroad to run all trains into that town instead of connecting by a "shuttle train" at Bridge Junction, the Central has finally capitulated, and will run all passenger trains into the city. The road, after being defeated in every state court, took an appeal to the United States Supreme Court, where the case is now pending. Its surrender makes further proceedings unnecessary.

The Lehigh Valley has restored the 10 per cent. which was cut off from the salaries of certain officers and employees in 1893. The change affects all salaried employees who received, before the reduction, $1,000 a year or more. A dispatch from Seattle, Wash., says that the Great Northern has "equalized the wages of agents, operators, roundhouse men and certain other employees, but in such a way that the employees look upon the change as a reduction instead of an equalization. A few have received slight advances, but many are reduced several dollars a month.

The Philadelphia & Reading has postponed the date for the introduction of the new fast trains between Philadelphia and New York, and the new time-tables, issued March 15, show nothing faster than two hours between the two cities. It appears that unexpected hindrances have been encountered, delaying the restoration of the bridge and roadway damaged by the floods near Bound Brook a few weeks ago, so that the track is not in suitable condition for the highest speed. No announcement has been made as to when the time of the trains will be quickened.

The "Railway Cripples' Association" is the last organization we have heard of. It is made up of railroad employees who have been crippled in the service. It appears that such a club has been in existence in the vicinity of Pittsburgh for some time, but now it has been decided to branch out and invite membership all over the country. It is evident that the leaders of the movement have up-to-date minds, even if their bodies are defective, for the first act of the national organization is to deposit $200 with the sporting editor of the Pittsburgh *Post*, as a preliminary to an athletic contest to be held next June.

The Brooklyn Elevated Railroad has discharged four ticket agents, three women and one man, and has assigned most of the others to different places from those which they have heretofore filled. It appears that the discharges are on account of dishonesty. A turnstile is used to register the number of passengers passing to the platform at the station, and this register is in charge of the ticket agent; and it is believed that passengers were allowed to pass around the stile instead of going through it. An officer of the road tells a reporter that when the women were employed it was thought that their honesty would be of a better quality than that of the men who previously sold the tickets, but he finds that he was mistaken.

A passenger train of the Missouri, Kansas & Texas was boarded by a masked man near Greenville, Tex., on March 13, and some of the passengers were robbed, but the robber jumped off before the trainmen knew that he was on board. In Salem, Ill., on the morning of March 12, about five o'clock, a robber entered the passenger car of a train of the Baltimore & Ohio Southwestern, which had been stopped at a crossing, and robbed one passenger before he was scared off. At a coal station, about two miles from Joliet, Ill., on March 8, in broad daylight, three robbers boarded a passenger train of the Chicago, Rock Island & Pacific, and "held up" one car, although it is not stated whether they got any money. They entered a second car and were repulsed by pistol shots from passengers.

The Season Ended for One Railroad.

The vacation season has not yet begun, but if the reader is longing for a rest he may take hope: the season has begun at one place at least. It is in the Grosse l'ête country, if you know where that is. The Louisiana Central Railroad, which helps to connect that part of the earth with the rest of the world, by way of the Texas & Pacific, announces that operations have been suspended for the summer. The trainmen's brotherhood should bestir itself to get jobs for the brakemen who will be thrown out of work. According to the annual report, printed in the last issue of *Poor's Manual*, the train mileage of the road averages about 12 miles a day.

Pneumatic Parcel Post for Paris.

Mr. Rouart has communicated to the Society for the Encouragement of Enterprises a project for the transportation of mail matter of every description between the Post-Office Building and the railroad depots in Paris. It is contemplated to replace wagons by a system of pneumatic tubes of an average length of about one mile. It is estimated that 1,000 pieces have to be sent through each every five minutes. Tubes of 15¾ in. diameter are assumed, in which boxes weighing 300 lbs. and carrying 220 lbs. each are propelled by compressed air. Rouart figures that a train of 10 boxes, carrying 2,200 lbs. of mail and express matter (on the continent the post-offices also handle express matter) would offer a resistance corresponding to a 17¼ ft. water column, of which 10⅝ ft. are chargeable to train friction, and the balance to friction of air in the tubes. A 200 H. P. engine would therefore be sufficient to serve the entire tube system of about six miles total length. The first cost is estimated at $170,000, the operating expenses at $10,000 a year, which is about 10 per cent of the cost of the present service.

State Taxation of Pacific Railroad Franchises.

The United States Supreme Court has handed down a decision prepared by Chief Justice Fuller, in the cases of the people of the state of California against the Central Pacific and the Southern Pacific Railroad companies, involving the right of the state to tax the franchises of those roads. The companies resisted taxation on the ground that their franchises were derived from the national government as well as from the state and were inseparable. The court decided against this view, holding that the railroad companies owe their existence as corporations to the state, and that they are subject to the state law in respect of taxation. The Chief Justice said the state franchises never had been merged in the federal franches, and that they were as legitimately subject to taxation as the roadbeds of the companies. Judge Field read a dissenting opinion, in which Judge Harlan concurred.

A Big Fee That Did Not Materialize.

The Chicago & Eastern Illinois and the Chicago & Indiana Coal Railroads were consolidated under the laws of Indiana, with a capital stock of $25,000,000, in 1894. When the agent of the consolidated company appeared in the office of the Secretary of State to file the articles of consolidation and learned that the State's fee was $25,000, he refused to file the articles. The State contended that the presentation of the articles was a filing in law, and brought suit to recover the fee. The lower court held in favor of the company and the State appealed. The Supreme Court has now affirmed that decision, holding that the mere presentation of the articles to the Secretary was not such a filing as the State could collect a fee for, and when the Secretary of State refused to accept the articles until the fee was paid, that ended its authority. The question whether the railroad company was legally compelled to file the articles in order to do business or whether or not the corporation is now a corporation *de jure* or one *de facto* was not touched upon in the decision.

Keely Motor News.

The stockholders of the Keely motor assembled last night to witness the initial trial of the machine on which the inventor has been working for the last 75 years. The trial was a complete success. The mechanism of the motor was contained in an old sardine box. Mr. Keely placed three drops of water in an interior compartment and by the aid of a violin bow produced certain virations. Instantly the ponderous fly-wheel attached to the box began to revolve, indicating a force of two million horse power. The shafting was attached to the central station of the Baldwin Locomotive Works, and the force was sufficient to turn every machine in the immense place, besides working the city water pumps, and developing enough current to operate the 500 miles of electric traction of which the city boasts. Mr. Keely is to be congratulated on his success—the result of many years of patient toil and an expenditure of $30,000,000.—*Press dispatch widely printed by daily papers.*

Acetylene News by Way of India.

Acetylene may give rise to an interesting legal discussion in the United States. The Standard Oil Company has taken up acetylene, and is preparing to push it; but the Pittsburgh Reduction Company, which has aluminum works at Niagara, says that it makes acetylene as a by-product in the manufacture of aluminum, and that it is not going to be interfered with by any acetylene patent. It is possible, however, that the two companies may come to terms.—*The Indian Engineer.*

We *might* add that the Standard Oil Company will make calcium carbide as a by-product of petroleum vaseline—but we refrain.

Chicago Harbor Matters.

Chicago will go before Congress with a memorial in answer to Major Marshall's report against the improvement of the Chicago River.

Not only will the city itself be fully represented, but the great railroad and commercial interests of the West and Northwest will array themselves solidly for the improvement of the old harbor to meet the advancing requirements of water transportation. The document is intended to controvert the unfavorable report of the government engineer at every point. High railroad officials have offered their services to the River Improvement Association, so deeply are they stirred up over the movement for the deepening of the Calumet, while the old harbor is passed by. It had become evident that the two appropriations must stand or fall together. For the sake of self-preservation the railroad and manufacturing interests now resting on the Chicago River, it was said, cannot permit without a struggle the construction of a harbor with 20 ft. of water at South Chicago unless the old harbor is also made accessible to the largest craft on the lakes.

Railroad officials stood aghast at the enormous expenditures which must be incurred in the duplication of terminals on the Calumet to meet the competition of lines which are already located there. Nor was the cost of these duplicated terminals the only item. The practical handling of business became a most serious matter. Cars when unloaded are not where they are wanted and must be hauled over long distances before they can be used again. Even now with the belt lines this is a great hardship on the trunk railroads.—*Chicago Tribune.*

Electric Transmission of Power.

An idea may be gathered of the extent to which transmission of power by electricity is gaining ground in this country by the statement that in the long distance plants installed by the General Electric Company during 1895 over 1,200 miles of copper wire for transmission purposes alone were used, amounting, practically, to 120,000 lbs of copper.

Stock Exchange Listings of Railroad Bonds.

The following issues of railroad bonds were last week listed in the New York Stock Exchange: Erie, general lien 3 and 4 per cent. gold bonds, $30,927,000; voting trust certificates for $30,000,000 of 4 per cent. non-cumulative first preferred stock, for $16,000,000 of 4 per cent. non-cumulative second preferred stock, and $99,990,000 of common stock. Burlington, Cedar Rapids & Northern, additional issue of first consolidated mortgage and collateral trust 5 per cent gold bonds, $584,000, making total amount listed $6,425,000. These bonds have been issued to retire an equal amount of Iowa City & Western bonds maturing March 1. Chicago, Burlington & Quincy additional issue of consolidated mortgage 7 per cent. bonds, $1,500,000, making total amount listed $28,177,000. These bonds have been issued to pay off $547,000 of the 7 per cent. bonds of the company maturing Jan. 1 last, and $952,000 to reimburse the treasury for expenditures for construction made prior to Dec. 31, 1888. Southern, additional issue of first consolidated mortgage 5 per cent. gold bonds, $1,828,000, making total amounted listed $25,839,000. Of these bonds $828,000 take the place of an equal amount of equipment liens paid off prior to Jan. 1 last, and the remainder are issued under the provision of the mortgage which set apart $5,000,000 as an improvement fund.

LOCOMOTIVE BUILDING.

The Mexican Central last week placed an order with the Rhode Island Locomotive Works for 10 locomotives.

The Norfolk & Western has just leased and put in service eight consolidation engines, six compound and two simple, originally built for the Toledo, Ann Arbor & Michigan road by the Cooke Locomotive Works, of Paterson, N. J. The ownership of the engines is vested with the Railroad Equipment Co, of New York.

The Canadian Pacific has under consideration the building of a large engine for service on the heavy grades on the Rocky Mountain division, with 20-in. × 26-in cylinders and 48-in. driving wheels; and also 10 heavy switching engines, with cylinders 18 in. × 24 in. and driving wheels 51 in. in diameter. The engines will probably be built in the company's shops.

CAR BUILDING.

The Chicago, Burlinton & Quincy is reported to be in the market for several thousand freight cars.

The Jackson & Woodin Manufacturing Co., of Berwick, Pa., has received the order for building the entire 1,000 coal cars for the Delaware, Lackawanna & Western.

The Ensign Manufacturing Company, of Huntington, West Va., has just shipped 20 double hopper bottom coal cars of 30 tons capacity to the Alameda & San Joaquin road of California.

The Philadelphia & Reading order for 1,000 freight cars given out this week was divided equally between the Union Car Co., of Depew, N. Y., and the Labanon Manufacturing Co., of Lebanon, Pa.

The Mexico, Cuernavaca & Pacific, now building in Mexico by J. H. Hampson, of Mexico City, will shortly place large rolling stock orders, and representatives of the company are now in the East in connection with these contracts.

BRIDGE BUILDING.

Atlanta, Ga.—Bids for the highway bridge over Jones avenue were received March 2, by R. M. Clayton, City Engineer. They were as follows: (*a*) signifying granite (*b*), limestone and (*c*) brick foundations: General Contracting Co., of Atlanta, Ga. (*b*), $21,000; (*c*), $19,016; Watkins-Hardaway, of Birmingham (*a*), $20,.10; Gillett-Herzog Manufacturing Co., of Minneapolis (*a*), $18,940; (*b*), $18,490; Fulton Building Co., of Atlanta (*b*, $18,900; (*c*) $16,800; Grant Wilkins, of Atlanta (*a*, $18,200; George E. King Bridge Co., of Des Moines (*a*, $17,990; (*b*), $17,230; (*c*), $16,700; Youngstown Bridge Co., Youngstown, O. (*a*), $17,894; (*b*), $17,494; (*c*). $16,894; Gude & Walker, Atlanta (*a*) $17,000; Toledo Bridge Co., Atlanta (*a*), $16,758; (*b*), $16,558; (*c*), $16,485; Edge Moor Bridge Works, of Wilmington, Del. (*a*), $16,500

Bids will be received until May 6 for a 180-ft. highway bridge over Peach Tree Creek. Address County Commissioners Fulton County, Ga.

Auburn, Me.—The Bridge Committee has been authorized to contract with the Youngstown Bridge Co., of Youngstown, O., for a temporary trestle bridge across the Androscoggin between Court and Main streets. The structure will be completed in 20 days, and will cost about $4,800.

Baltimore, Md.—An iron viaduct several hundred feet long will probably be built on the division of the Baltimore Traction Co. to be built in the southern suburbs and which will be called the Shore Line road. Hon. Frank Brown, corner Charles and Saratoga streets, may be addressed.

Bay City, Mich.—The Detroit & Mackinac Railway will build a bridge over the Kawkawlin River at this place. It will be of steel 40 ft. long.

Carbondale, Pa.—The contracts for constructing Melan Arch bridges at Sixth, Eighth and Salem avenues have been awarded to Clark & Co., 100 Broadway, New York, for an aggregate of $20,000. Work will be begun about April 1.

Canton, Pa.—A two-track stone arch will shortly replace the present wooden bridge of the Northern Central over the deep ravine just west of this place.

Chicago, Ill.—Bids will be received until March 23 for the operating machinery and electrical equipment of the North Halsted Street bridge. W. D. Kent, Commissioner of Public Works.

Cincinnati, O.—The City Engineer is preparing estimates of the cost of a steel viaduct from the Grandin road to Tusculum. This viaduct, if built, will be about 1,200 ft. long. Its estimated cost is about $200,000.

Cohasset, Mass.—A meeting of the citizens of this place was held recently concerning a bridge over Gulf River. At this meeting it was voted to have estimates and plans made for the said bridge.

Corning, N. Y.—Bids will be received until April 18 for two bridge spans, to be used in connection with the proposed system of flood protection along the Chemung River. Address, Frank D. Kingsbury, as above.

East Rockaway, L. I.—The Long Island Railroad is to build a new wooden bridge over Powell's Creek, at East Rockaway.

Hawkinsville, Ga.—Bids will be received, we are informed, until May 6 for about 400 ft. of iron or steel viaduct. Address P. T. McGriff, as above.

Joliet, Ill.—The Joliet Bridge & Iron Company has been incorporated at Joliet with a capital stock of $100,000. Incorporators: Robert C. Morrison, S. P. Avery and John Heatherwick.

Leavenworth, Kan.—Bids will be received until April 13 for a highway bridge on the Sullivan road, near here. T. W. Niehaus is County Clerk.

Lima, O.—Bids will be received until April 2 for a steel bridge over the Ottawa River, on East Market street, and for removing the present bridge to a new location at West street. R. H. Gamble is City Engineer.

Livermore Falls, Me.—It was voted at town meetinge at East Livermore and Livermore, March 9, to immediately purchase a steel bridge to replace the one across the Androscoggin River, washed away by the freshet.

Menasha, Wis.—W. W. Reed, has, it is reported, completed the plans and specifications for the Lake Butte des Morts drawbridge. This structure will have about 3,000 ft. of pile and trestle approaches and 160 ft. swing span. It will cost about $20,000.

Merced, Cal.—The County Supervisors of Merced County will build a steel bridge over the Merced River at this place to cost about $50,000.

Nashville, Tenn.—A company has been formed to erect a bridge over the Forked Deer River, in Lauderdale County.

New Boston, N. H.—A contract has been made with the Berlin Iron Bridge Co. by which it agrees to take the old bridges, which were swept away by the freshet, from Railroad street and near Gregg place, and replace them with new ones.

New York.—The East River Bridge Commission met March 11 and received maps of the piers and approaches to the bridge from the Chief Engineer. The Board now has under consideration the bids submitted to it recently regarding borings, for which Sterns Brothers, of Brooklyn, were the lowest bidders. A bill has been introduced in the legislature which provides that the Bridge Commissioners shall acquire by purchase or condemnation any land under or above water between Pier 57 near the foot of Broome street, and Pier 59, near the foot of Delancey street, which may be necessary for the construction of the bridge. Justice Gaynor, of the Supreme Court, in Brooklyn, March 16, granted the application of William Gordon, a taxpayer, for an injunction restraining the Bridge Commissioners from purchasing the so-called Uhlmann franchise.

Secretary Swan, of the New York & New Jersey Bridge Company, received word March 16 from Secretary of War Lamont that he has approved the plans for the bridge as well as the location selected by the Commissioners of the bridge and the Sinking Fund Commissioners of New York.

Oakland, Cal.—The City Engineer of this place has made plans and estimates of the cost of partially rebuilding the bridge at Eighth street. The estimated cost for this work is about $7,500.

Ottawa, Ont.—The Dominion Senate has passed a bill giving the Canada & Michigan Bridge & Tunnel Company power to construct a high-lever bridge, with a span of 1,100 ft., across the Detroit River.

Philadelphia, Pa.—The Board of District Surveyors have approved the plans for the bridge of the Philadelphia, Bustleton & Trenton Railroad over Oxford Road, in the Thirty-fifth Ward.

Chief Webster, of the Bureau of Surveys, has plans ready for the new drawbridge over Frankford creek, at Bridesburg, for the use of the trolley lines connecting Bridesburg, Frankford and Tacony. The tracks are already laid to both ends of the old bridge.

Portland, Me.—The plans for the rebuilding of Prides Bridge are nearly completed. The bridge is to be 41 ft. long in one span. Bids for its construction will soon be advertised for. A ferry across the river is being maintained by the city.

Ridgewood, N. J.—The following bids were received on March 16 for constructing a 25-ft. Melan arch bridge 26 ft. wide over Saddle River:

Dean & Westbrooke, 36 Liberty street, New York	$1.918
Clark & Co., 100 Broadway, New York	1,928
Frank R. Long, 253 Broadway, New York	1,899
J. J. Van Nordt, Passaic, N. J.	1,840
A. L. Terwilleger, Paterson, N. J.	1,845
Joseph Sharpe, Paterson, N. J.	1,690
White & Carlough, Waldwick, N. J.	1 500

Contract awarded to White & Carlough.

Raleigh, N. C.—The contract for the bridge over Cary Creek in Buckhorn County, will be let in the near future. Address J. C. Valentine or J. S. Phillips, as above.

St. Thomas, Ont.—The contract for the 110-ft. steel span at Dingle street has been awarded to the Peterborough Bridge Co., of Peterborough, Ont.

Salt Lake City, Utah.—The Andrews Bridge Company of Ogden, are building a steel and wooden bridge about 12 miles south of this city in Sweetwater County. It will cost $4,500.

Shamokin, Pa.—Representatives of the county, City Council, Board of Trade, and Reading and Northern Central railroads conferred last week concerning the erection of an overhead bridge over Shamokin Creek and the railroad tracks at the Cameron colliery. The Commissioners expressed a willingness to construct the bridge providing the railroad companies will pay their share of the expenses. Plans are now being drawn. The bridge will cost about $18,000.

Stokes County, N. C.—The County Commissioners of this county, at a recent meeting, decided to build a steel bridge several hundred feet long, across Town-fork Creek, on the Germanton and Danbury road. A committee was appointed to prepare estimates and specifications and receive propositions from contractors and others. Address W. H. Bynum, Danbury, Stokes County, N. C.

Trenton, N. J.—The House has passed a bill allowing the freeholders of Middlesex County when directed by a vote of the people to build a bridge over the Raritan River from Perth Amboy to South Amboy.

Walkerton, Ont.—The Strattford Bridge Co. has secured the contract for building the superstructure of the steel bridge at Tara, at $1,285. George Baker, of Allenford has secured that for the stonework for abutments, at $5 per cubic yard.

Washington, D. C.—The House Committee on Commerce, March 10, voted to report favorably the bill introduced by Mr. Murphy, of Illinois, for a railroad bridge to be built over the Mississippi River at East St. Louis by the East St. Louis Bridge & Construction Company. The amendments provide that there shall be no consolidation or pooling with any other bridge company.

Representative Terry, of Arkansas, March 11, secured the passage by the House of a bill to authorize the construction of a free bridge across the Arkansas River connecting Little Rock with Argenta.

A strong statement in support of the Grand Island Bridge bill was made before the House Commerce Committee at Washington, March 10, by Capt. Symons, the United States Engineer officer stationed at Buffalo. This bill provides for a bridge over the Niagara River at the upper end of Grand Island.

West Springfield, Mass.—The question of a new bridge between this place and Merrick is being discussed.

Winnipeg, Man.—Plans are now being prepared by the City Engineer for an overhead crossing of the Canadian Pacific Railroad at Salter street. Another civic work of importance to be gone on with this year will be the rebuilding of the Main street bridge.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Milwaukee & St Paul, semi-annual, 3½ per cent. on the preferred stock, and semi-annual, 2 per cent. on the common stock, payable April 20.

Pittsburgh, Youngstown & Ashtabula, semi-annual, 3½ per cent. on common and preferred stock.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Canadian Pacific, annual, company's office, Montreal, Canada, April 1.

Chicago & Alton, annual, company's office, Chicago, April 6.

Joliet & Chicago, annual, company's office, Chicago, April 6.

New York Central & Hudson River, annual, company's office, Union Station, Albany, N. Y., April 15.

Norfolk & Southern, quarterly, 1 per cent., payable April 10.

Panama, annual, company's office, 29 Broadway, N. Y., April 6.

Pennsylvania, annual, election will be held at the Broad Street station, March 24.

Pittsburgh, Cincinnati, Chicago & St. Louis, annual, Penn avenue and Tenth street, Pittsburgh, Pa., April 14.

Texas & Pacific, annual, company's office, 195 Broadway, New York, March 18.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its next annual convention at Niagara Falls, beginning on Sept. 8.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago. Mr. George M. Basford, is secretary, The Rookery, Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736–1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

American Society of Civil Engineers.

A regular meeting of the society was held on Wednesday, March 18. A paper by H. W. York, Jun. Am. Soc. C. E., entitled, "The Twenty-Eighth Street Central Station of the United Electric Light & Power Company" (see Proceedings for February, 1896, already published), was presented and discussed.

General Passenger Agents' Association.

The semi-annual meeting of the American Association of General Passenger and Ticket Agents was held in Richmond, Va., March 17. D. J. Flanders (Boston & Maine) was elected President, and W. A. Turk (Southern), Vice President. Messrs. Martin, Daniels, Ford, Turk and Stone were appointed a committee on reorganization. B. W. Wrenn, of the Plant System, delivered the annual address on Wednesday.

Western Railway Club.

Four subjects were announced for discussion at the meeting of the Western Railway Club on Tuesday, March 17, in the Auditorium Hotel, Chicago. The first was on Mr. J. N. Barr's paper entitled "The Ninety and Nine," read at the January meeting. The second discussion was on "Piece Work in Car Shops," based on the paper presented by Mr. G. L. Potter at the February meeting. These were to be followed by a report upon "Standard Loading of Lumber and Timber," covering suggestions recently made by Mr. Pulaski Leeds, and a topical discussion on "Swing versus Rigid Trucks."

New England Railroad Club.

The annual meeting of the New England Railroad Club was held at 36 Bromfield street, Boston, last week, and the following officers elected: *President*, L. M Butler, Master Mechanic, New York, New Haven & Hartford; *Vice President*, John Medway, Superintendent Motive Power, Fitchburg; *Treasurer*, Charles W. Sherburne; *Executive Committee*, L. M. Butler, C. E. Fuller, J. T. Chamberlain, T. B. Purves, Jr., Henry Bartlett; *Finance Committee*, L. M. Butler, F. E. Barnard, George H. Wightman.

Mr. C. W. Willis, a member of the club, read a paper describing the Jamaica railroads.

Engineers' Club of St. Louis.

The club met at 1600 Lucas place on March 4, President Ockerson in the chair. Eighteen members and two visitors present.

The paper of the evening, by Mr. O. W. Ferguson on "A New Design for and Method of Reading a Stadia Board," was read in Mr. Ferguson's absence by Mr. F. B. Maltby. The paper was accompanied by blue prints showing the proposed marking of rod. The author explained the difficulties he had met with, and gave reasons for the remedies proposed. Messrs. F. B. Maltby, and W. G. Comber submitted written discussions. The others partipating in the discussion were Messrs. Turner, Van Ornum, Jolley and Ockerson.

Attention was called to the fact that the system proposed was not new, but had been tried years ago. Reasons were given why it had not proved desirable in practice and had been discarded.

Ohio and Mississippi Valley Passenger Committee.

The general passenger agents of the Southern and Southwestern lines met in St. Louis March 11 and organized the Ohio and Mississippi Valley Passenger Committee. The following lines were represented: Mobile & Ohio, Nashville, Chattanooga & St. Louis, Louisville & Nashville, Southern, Queen & Crescent, Memphis & Charleston, Kansas City, Memphis & Birmingham and Illinois Central. The territory to be included is that bounded by the Ohio on the north, the Mississippi on the west and a line drawn from Mobile through Montgomery, Birmingham, Morristown to Cincinnati on the east. Articles of agreement were adopted, but no officers have been elected. The headquarters will probably be at Louisville. General Passenger Agent Atmore, of the Louisville & Nashville, acted as Chairman, and will call the next meeting.

Western Foundrymen's Association.

The regular meeting of the Western Foundrymen's Association took place at the Great Northern Hotel, Chicago, on Wednesday evening, March 18. It is now the practice of this club to have any questions relating to foundry practice which members would like to have discussed, sent in to the Editing Committee. They keep a list of these questions and publish it in the notices of the meetings that are sent around to the members. At any time the members deem it desirable to have a further discussion on questions that have already been before the club, the committee will be pleased to consider the matter. The following list of questions is now ready for discussion in the order named: Is it desirable to have a recognized apprenticeship system, and, if so, what is the best form? Are foundries generally noticing an irregularity in the grading of foundry pig iron? If so, does this irregularity exist more generally in Northern than Southern irons? Does it apply to both charcoal and coke irons, and in your opinion is any of the difficulty traceable to an extra desire on the part of furnaces to supply their Bessemer pig iron trade at the expense of their foundry trade? In your experience, what is the most efficient method of cleaning light castings? What is the proper temperature to bake cokes? What method do you use for determining this temperature? What is the proper amount of air, and pressure of same to melt iron in a cupola, and what are the effects of too little or too much air? Is it economical to ventilate a foundry artificially? What has been your experience? What is the best method of lighting a foundry of modern design?

The Railway Signaling Club.

The regular meeting of the Railway Signaling Club was held at the Great Northern Hotel, Chicago, March 10. The discussion of the evening was upon the report of the Committe on Color of Lights for Night Signaling. We expect to give a synopsis of the report and of the discussion in a future issue. The meeting evidently agreed with the Committee that it was inexpedient to recommend radical changes at present. No action will be taken in the line of sending out a recommendation by the Club in regard to lights until the wishes of all the members are ascertained by letter ballot.

At this meeting the report of the Committee on Interlocking Rules was received and discussion of the subject deferred until the next meeting, which will be held May 12.

Traveling Engineers' Association.

The Committee on Fuel and Water Supply issues a circular asking answers to the following questions:

Fuel Supply.—1. Under the supervision of what official of your road is the locomotive fuel supply? 2. Assuming that your fuel supply is of a varying quality, what effort is made by those controlling it to keep it as near uniform as possible on a given district or division?

3. Has a systematic method been adopted on your road of districting the fuel supply? If so, please state fully plans employed and results obtained. 4. What would be the advantage gained by districting the fuel supply? 5. Would it tend to economy and improved service if your fuel supply was under the supervision of your mechanical department chief? A full expression of opinion is solicited in answer to questions 4 and 5. 6. Is the head of your mechanical department consulted with reference to any proposed changes in fuel?

Water Supply.—1. What department of your road is charged with the control and maintenance of the water service? 2. Would it result in economy and improved service if the furnishing of water for locomotive use were under the control of the mechanical department chief? Give reasons. 3. Is the head of your mechanical department consulted with reference to quality of water furnished? 4. Does your road have feed water analyzed? 5 What is the life of flues in your best and worst feed water, and what methods have been employed to overcome effects of bad water?

This report was continued from last year and the committee would be pleased to receive any additional information over and above the foregoing questions. The chairman of the committee is W. R. Scott, 505 East Second street, Newton, Kan. The others members are George Gregory, S. W. Simonds, J. N. Barr and D. Meadows.

The North West Railway Club.

At the February meeting of the North West Railway Club an important discussion was held on the method of rating locomotives. A pretty full abstract of this discussion appears in this week's issue of the *Railroad Gazette.*

At the same meeting Mr. F. B. Farmer, of the Westinghouse Air-Brake Co., presented a paper on "The Superintendent of Air-Brakes." He argued that such an officer is necessary on the railroad companies and that the title of superintendent is desirable for various reasons, not the least of which is that it will add to the dignity and authority of the office. A few extracts from his paper follow.

THE SUPERINTENDENT OF AIR-BRAKES.

Recognition of this need is furnished by higher officials in all papers on air-brake subjects read by them before railway associations and clubs, and the discussions following. The most recent of these is the able one presented before the Western Railway Club by Mr. A. M. Waite. Had the paper been written for the purpose of demonstrating the need of a competent man to give especial attention to the air-brake department, more cogent reasons could scarcely have been advanced. In an extract from the discussion on this paper, as published in the *Railroad Gazette* of Dec. 17, 1895, two speakers directly recognized this feature, as will be seen from the following quotations: Mr. G. W. Rhodes: "The attention called to the need of looking after new equipment in the application of brakes is timely." Mr. D. L. Bardes: "The valuable lesson from Mr. Waite's paper teaches that air-brakes must receive intelligent care." The brake losses that are continually taking place through lack of an efficient head to this department are: 1st, incorrect application and repairs necessitating change and causing continual loss until same is made; 2d, incorrect use by train and enginemen causing unnecessary damage to lading and equipment. As an example of the first the following errors are cited: Though now almost obsolete, a few years ago the practice was quite common of connecting the air-pump discharge pipe to the one from main reservoir to brake valve, the object being to save a few feet of pipe and a reservoir connection. The results were: Gage soon worn out from vibrating at each stroke of pump; dirt and moisture passing through the pump was, instead of being deposited in the main reservoir, carried back into the train, causing engineer's and triple valves to clog up and wear rapidly; hose to disintegrate and burst, and, by water collecting in the train pipe, triple valve and auxiliary reservoirs render the brake less efficient in summer and cause failures in freezing weather. The writer observed a case a few years ago where a modern engine came so equipped from the locomotive works, and, though the W. A. B. Co. had sent out a pamphlet showing the right and wrong way to make connections referred to, and calling attention to the dangers of the latter, there being no one to give especial attention to the brakes or instruct men, the matter went unnoticed until a wreck occurred in which three engines were heavily damaged. The train, which was all air-braked, ran away down a heavy grade because the rotary valve was so badly cut that brakes released as soon as applied. Even then, had the engineer been instructed on the brake previously, he would have known how to thoroughly recharge the train, and by use of the emergency avoid the wreck, as the conditions were especially favorable for such a mode of procedure. On another road one inspector removed during a winter forty cut cocks which had frozen and burst, and due to the same cause as just mentioned. This, too, on a short road having heavy grades, where every air-brake car was needed.

We find, as a rule, that the men placed in charge of the air-brake department have formerly been either engineers or machinists. In filling this position some have thought it better to choose from among the engineers because of their train service experience and the prestige this gives with men in that department. However, an intimate acquaintance with many railroad air-brake men, some of whom were formerly engineers and others machinists, justifies the assertion that success or failure, so far as the man himself is responsible for, depends less on the character of his former occupation, so long as it has been in the mechanical line, than on the amount of intelligence, good judgment, tact and perseverance he possesses. No matter what his previous calling, he will have much to learn and many obstacles to overcome. Therefore, in the selection of a man for this position these should be the ruling considerations.

The duties of the position should be to superintend—used in the full meaning of the word—every detail pertaining to the brake. This should embrace the outlining of instruction to be given to road and shop men regarding operation, equipping and repairs: examination for employees and those seeking employment whose duties are connected with the brake in any manner; approval of all brake designs, and the issuing of all air-brake circulars or bulletins.

In the selection of a Superintendent of Air-Brakes a man should be chosen in whom authority can be vested without fear of its abuse. While no important action should be taken without the sanction of the General Superintendent, Mechanical Superintendent, or, when an independent department, the M. C. B., depending on which it affects, he should not be hampered in minor details. All brake matters should be passed upon and instructions issued by him, subject only to the proper one or ones of the officials mentioned.

The first effort should be to obtain a thorough knowledge of the equipment, points where repairs are made and manner of making latter, and, at the same time, pursue the work of instructing that must be constantly carried on. If the system is one of considerable size it will not be possible for one man to do the instructing, and he should, therefore, early post up each traveling engineer, car and locomotive repair man thoroughly, that they may continue the work. The character of the instruction given by the latter should be principally object lessons. One of the present weak features with road men is their inability to correctly locate defects and promptly repair or report them Quite recently an air-brake repair man called the writer's attention to the report, "Air-pump and steam-heat governor won't work. Overhaul them," and asked advice as to what ought to be done to the pump, the engine being cold. It was quite evident that the pump worked, though possibly badly, when train was brought in by this engine, as necessity for using hand brakes would have been reported to the mechanical department. As additonal evidence of the need for instruction in this particular, two other sample reports are submitted: "Air whistle blows all the time." Examination and inquiry developed that the whistle did not blow all the time, but only when the brake was released. The report indicated a defect in the signal valve, where, in reality, it existed in the reducing valve. As dirt is the common trouble here, if the engineer had understood he could probably have remedied it in a few minutes. "Driver brake releases." Here the repair man is at a loss to know whether the trouble is due to cylinder leakage, leaky rotary valve or improper action of the triple valve. Either a leaky rotary or brake cylinder leakage is easily detected by a simple test; but, if the report had merely stated whether or not release took place through triple valve, a very definite idea would have been conveyed as to location of defect.

These are but a few of the many indefinite reports met with, and are not given as reflecting on the intelligence of the engineers; for without instruction it cannot be expected they should do better. Nevertheless, it indicates what an amount of valuable time the air-brake repair man can lose in endeavoring to locate and remedy the trouble—especially if the brake cannot be tested—the unnecessary expense incurred, and the character of the instruction the repair man should give.

General air-brake repair work should be centralized as much as possible, and the best men given in charge of it. Outside of these general repair points, little repair material should be carried, complete pieces of the brake being furnished instead, and defective material removed and sent in to the general repair point. Facilities should be provided at the general repair point to do work in the best and most expeditious manner; above all the utmost care should be given to the maintaining of standards. Cheap material is especially expensive in this work.

Another paper presented at the same meeting was on the "Economy of Uniformity in Railway Equipment and Methods," by Mr. S. F. Forbes, General Storekeeper of the Great Northern. Mr. Forbes made quite an elaborate statement of the advantages to be derived from uniformity in material and methods.

PERSONAL.

—Mr. E. L. Brown, formerly Master of Transportation of the St. Paul & Duluth, has been appointed Superintendent of the road, with office at St. Paul.

—Mr. Charles L. Frost, a former Superintendent of the Fort Worth & Denver City road, and a prominent citizen of north Texas, died at San Antonio, Tex., March 8, aged 50 years.

—Mr. John I. Hall, Assistant Attorney-General of the United States Interior Department, has resigned to accept the position of General Attorney for the Georgia Southern & Florida.

—Messrs. Nicholas Krezyanski and Wasily Knowznechoff, officers of the Siberian Railway, arrived in this country last week, and on Tuesday were at the Baldwin Locomotive Works, Philadelphia.

—Count Sorakitche and Count Owelaya, mechanical engineers in the service of the Government of Japan, have lately arrived in this country. It is said that they are likely to give orders for locomotives.

—Mr. H. C. Detwiller, a graduate of Lehigh University and an Assistant Engineer of the San Domingo Improvement Co., which is building the railroad to Santiago, died of yellow fever in San Domingo last week.

—Mr. James Mosher has been appointed General Eastern Freight Agent in New York for the Baltimore and Ohio, in place of Mr. E. C. Rose, who for a number of years has been the company's General Eastern Traffic Agent.

—Mr. R. H. Wallace, Traveling Passenger Agent of the Erie road, has been appointed Acting General Agent of the Passenger Department at Cleveland, pending the appointment of a permanent successor to the late Mr. L. M. Fouts.

—Mr. F. R. Briggs has resigned as General Passenger Agent of the Cleveland, Canton & Southern road. He has held the position about four years and has been on the road for 14 years, a part of the time as passenger conductor.

—Mr. A. D. Scroggy, General Freight and Passenger Agent of the Seatle, Lake Shore & Eastern, at Seattle, Wash., has resigned that office to take a position with the Southern Pacific in its traffic department at San Francisco.

—Mr. W. H. Wood, Auditor of the Cleveland, Canton & Southern, has been placed in charge of the passenger department of that road until the appointment of a successor to Mr. T. R. Briggs, the late General Passenger Agent.

—Mr. Tyler C. Burpee, late Assistant Engineer on the Bangor & Aroostook, has been appointed Engineer of the location for the Woodstock & Centerville road in New Brunswick. Mr. Frank D. Lawlor is Chief Engineer of this road.

—Mr. George R. Blanchard, Commissioner of the Joint Traffic Association, has received from his late associates in Chicago, chiefly railroad officers, a present of a handsome mahogany desk and chair, accompanied by a set of complimentary resolutions.

—Mr. Russell Harding, Superintendent of the Dakota Division of the Great Northern, has been appointed General Superintendent of the Western District, with headquarters at Spokane, Wash., vice Mr. J. M. Barr, recently transferred to the Eastern District.

—Mr. George E. Peabody has resigned as Assistant Treasurer of the Pennsylvania Railroad Company in consequence of ill health. He will probably continue with the company in another position. He has been Assistant Treasurer since 1887. He began as a clerk in 1873.

—Mr. J. W. Brown, Jr., of Norfolk, Va., who for some years has been Ticket Agent of the Seaboard Air Line at the Union station in that city, has been appointed Southern Passenger Agent of that road and the Bay Line of steamers, operated by the same company.

—Mr. George H. Smith has been appointed Assistant General Passenger Agent of the Cincinnati, Hamilton & Dayton. He has been recently Chief Clerk to the General Passenger Agent This latter office has now been abolished on the promotion of Mr. Edwards to be Passenger Traffic Manager.

—Mr. Theodore Klein, formerly of the Mexican National road, will, on May 1, take the position of General Manager of the Interoceanic railroad of Mexico. Acting Manager Stewart will accept a place on the local Board of Directors. Mr. Klein is now General Superintendent of the Central of Georgia.

—Mr. T. E. Adams, Master Mechanic of the Northern Division of the Great Northern, has been appointed Superintendent of the Dakota Division, vice Mr. Russell Harding, promoted, and Mr. T. E. Cramer has been appointed Master Mechanic of the Northern Division, to succeed Mr. Adams, promoted.

—Mr. D. J. Edwards has been made Passenger Traffic Manager of the Cincinnati, Hamilton & Dayton road. The office of General Passenger Agent, which he has held since 1893, will be abolished. Before going to the Cincinnati, Hamilton & Dayton Mr. Edwards had been General Passenger Agent of the Queen & Crescent.

—Mr. Ralph B Turner, Division Superintendent of the Cincinnati, Hamilton & Dayton, has been promoted to be General Superintendent of the road to succeed Mr. Waldo, who becomes General Manager. Mr. Turner, like his superior, received his early railroad training on the Michigan Central. He went to the Cincinnati, Hamilton & Dayton in 1891 as Division Superintendent.

—Mr. S T. McLaughlin, now General Manager of the Continental Fast Freight Line, has been appointed General Freight Agent of the Baltimore & Ohio Southwestern. His office will be at Cincinnati instead of St. Louis, the general offices of the traffic department being now located at the former city. Mr. R. M. Fraser, who was formerly General Freight Agent, has been made Freight Claim Agent.

—Mr. N. W. Pratt, President of the Babcock & Wilcox Co., of New York, died at his home in Brooklyn, N. Y., on March 10, aged 44 years. Mr. Pratt entered the office of Babcock & Wilcox as a boy. When the business was incorporated, in 1881, he became Treasurer of the company, and in 1893, on the death of Mr. Babcock, he was elected President. He was a member of the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the Engineers' Club of New York and other societies.

—Mr. Robert Lenox Belknap, formerly Treasurer of the Northern Pacific road, died at his home in New York City on March 13. His term as Treasurer of the Northern Pacific Railroad extended from 1879 to 1888. Besides holding this office he was interested in the development of lands along the line and was the first President of the Land Improvement Co., which laid out the site for the present city of West Superior, Wis., about 1883. In recent years he had not been in active business life, giving up almost all his time to charitable and philanthropic work.

—Mr. Addison L. Griffin, General Agent of the Carnegie Steel and Iron Co., died on the steamship Fulda while on his way from Genoa to New York City. His death occurred on the day after the vessel left Genoa. He was about 60 years old, and during all his business life had been connected with iron and steel interests. For many years he was President of the Keystone Bridge Co., and up to its consolidation with the Carnegie interests in 1892. Previous to this date, however, he had been associated with the Carnegie Company in various capacities, and for the last few years he had occupied the office of General Agent.

—Mr. T. W. Galleher, Division Freight Agent of the Baltimore & Ohio, has been appointed General Freight Agent of the Pittsburgh division and Trans-Ohio lines He succeeds Mr. C. S. Wight, who, as announced last week, has been transferred to Baltimore as Freight Traffic Manager. He has been in the Baltimore & Ohio service a long time, beginning in 1872 as a telegraph operator. In 1878 he was transferred to the freight department, and became Division Freight Agent. Afterward, when that office was abolished, he acted as Chief Clerk to the Assistant Freight Agent at Columbus, O., and Pittsburgh, and again became Division Freight Agent, holding that office up to this date, his entire railroad service having thus been with the Baltimore & Ohio.

—Mr. Charles G. Waldo, formerly General Superintendent, is now General Manager of the Cincinnati Hamilton & Dayton, assuming the duties of the latter office on March 17, when Mr. William M. Greene, the former General Manager, left Cincinnati for Baltimore. Mr. Waldo became General Superintendent in 1893, being promoted to the office on the resignation of Mr. Charles Neilson, now Second Assistant Postmaster-General. He has been in the service of the company, however, since 1889, first as Purchasing Agent and then as Assistant to the President from 1892 until he was made General Superintendent. Mr. Waldo was on the Michigan Central before going to the Cincinnati, Hamilton & Dayton, his last position on that road being as Secretary to the then General Superintendent, Mr. E. C. Brown.

—Colonel Daniel R. Garrison, a member of the well-known Garrison family of New York state, died at Ocean Springs, Miss., last week, aged 60 years. Mr. Garrison for many years had lived at St. Louis, where he was an important figure in the business affairs of the city. In his early business life he was engaged in engine and machine building at Buffalo and Pittsburgh, but about 1835 removed to St. Louis. In 1848, with his brother, he organized a firm to manufacture steam engines at St. Louis and acquired a large fortune, retiring from business many years ago. About 1852 he became interested in railroad building and took hold of the Ohio & Mississippi road when it was in poor financial condition and completed it to St. Louis, giving the latter city its first eastern railroad connection. Afterward he was interested in the Missouri Pacific road and for a time was Vice-President and General Manager, holding these offices until 1870. In 1874 he was elected Vice-President and General Manager of the Missouri Pacific and the Atlantic & Pacific. He was also interested in the Vulcan Iron Works, in South St. Louis.

—Mr. Andrew J. Post, senior partner of the engineering and contracting firm of Post & McCord, of New York City, died at his home in Jersey City, March 12, aged

62 years. He was a son of Simeon S. Post, of Vermont, a very well-known engineer. The son studied engineering under his father and in 1859 started in business for himself, organizing the firm of Post & McCord. The firm made a specialty of bridge building until 1876. Since that time it had engaged largely in the construction of iron buildings and had contracts for many of the important structures of this class erected in New York and its vicinity in recent years. Among other buildings the firm erected the iron work of the Grand Central Station in New York City. Mr. Post was elected a member of the American Society of Civil Engineers in 1871 and belonged to numerous other societies.

Concerning Mr. Post, an old friend and fellow-member of the American Society of Civil Engineers, writes as follows:

"I am pained to know that our old friend, Mr. Andrew J. Post, is recently deceased. He was a thorough and competent engineer and a faithful friend. Doubtless you know that he was the eldest son of Major S S. Post, a conspicuous railroad engineer in his time, who had much to do with the location and construction of the Erie Railroad in its early stages. To Major Post is due —as may be found recorded in an early copy of the Proceedings of the American Society of Civil Engineers— the introduction of the baggage check. Major Post, in his capacity as Assistant Engineer of the Erie Railway, prepared early a report, in which this railroad was compared with what is now known as "The New York Central & Hudson River Railroad," with a view to determine how far each was superior to the o her in location and facilities for operation. This report, with a number of others of a similar character and perhaps of equal importance, may be found in manuscript—the whole bound together and comprising a large book—in the library of the American Society of Civil Engineers. My recollection of his discussion of the general railroad question, as thus printed leads me to suggest that it would be of great interest, and perhaps of instructive value, if it were reprinted.

"'Andy' Post, as his friends used to call him, once related to me this incident, which indicates how sometimes we may form wrong conclusions as to the origin of certain methods in construction. His father was the Post of 'Post's Truss'; Andy, a boy in his office, one day was making a design for an ordinary railroad bridge. It occurred to him that possibly the design might be somewhat more pleasing, if he inclined the members usually vertical, from the piers each toward the center, and he so did. When his father saw the design, he said to his son: 'I like the looks of that—we will build it that way.' And that was the origin of what is known as 'Post's Truss,' and which our old friend, Professor Wood, in one of his textbooks, has discussed quite at length to show its economy in the disposition of material."

ELECTIONS AND APPOINTMENTS.

Atlanta & Charlotte Air Line.—The stock and bondholders held the annual meeting at New York City on March 11, and the old Board of Directors was re-elected, with the exception that Frederick Cromwell and John Middleton replaced Richard Irwin and P. P. Dickinson, deceased. The directors re-elected C. S. Fairchild, President; N. N. Wilmer, Secretary and George Herman, Treasurer.

Baltimore & Ohio Southwestern.—L. B. Lewis has been appointed Agent at Athens, O., vice W. A. Teter, resigned.

Cincinnati, Hamilton & Dayton.—The promotion of Mr. C. G. Waldo to be General Manager, and of Mr. R. B. Turner to be General Superintendent, has resulted in a number of changes in the transportation department. Mr. F. A. Husted, who has been Superintendent of the Dayton & Miami Division at Lima, O., has been transferred to Cincinnati as Mr. Turner's successor as Superintendent of the Cincinnati Division. Mr. S. B. Floeter, of the Wellston Division, has been transferred to Lima to succeed Mr. Husted, and Mr. Gordon, at present Train master, has been promoted to be Division Superintendent at Wellston, O.

Columbus, Hocking Valley & Toledo.—Stockholders of the railroad met in Columbus, O., last week, and elected Directors as follows: Samuel D. Davis, Thomas F. Ryan, Charles B. Alexander, of New York, for three years; W. A. Mills, of Columbus, O.; C. Morris, of Cleveland, and J. W. Ellsworth, of Chicago, for two years; Calvin S. Brice, P. W. Huntington and James Kilbourne for one year. The election of officers resulted in the re-election of Samuel D. Davis as First Vice-President; C. B. Alexander as Second Vice-President, and W. A. Mills as General Manager. The office of President will remain unfilled for the present.

Mexico, Cuernavaca & Pacific.—The annual meeting of the stockholders was held at the company's office in Denver. The following officers were chosen: J. H. Hampson, President; W. O. Staples, Vice-President and Treasurer; Charles Wheeler, Secretary.

Michoacan & Pacific.—On March 14 the office of the General Superintendent, Mr. L. R. Gordan, was removed from Maravatio to Las Trojes. The post-office address is Las Trojes, Ocampo, Michoacan, Mexico.

Missouri Pacific.—The present directors were selected at the annual meeting at St. Louis last week, 371,978 shares of stock being noted. The directors are: George J. Gould, Russell Sage, Edwin Gould, Louis Fitzgerald, John P Munn, John G. Moore, Howard Gould, Samuel Sloan, Thomas T. Eckert, D. D. Parmly, New York; S. H. d. Clark, D. K. Ferguson, C. G. Warner, St. Louis.

Nypano.—The Ohio and Pennsylvania divisions of the recently formed Nypano Railroad have been formally consolidated. C. E Whitehead is the President; John Tod, Vice-President, and C. C. Mason, of Cleveland, Secretary.

Peoria & Pekin Union.—The stockholders elected as directors last week C. E. Schaff, Big Four; E. P. Houston, P., D. & E; Bluford Wilson, C., P. & St. L., and H. L. McKee, Wabash, to serve for four years. The directors elected C. H. Bosworth, Springfield, President; E. F. Osborne, Vice-President, and H. K. Pinkney, Secretary.

Sunnyside & Western.—The directors of this company, just organized in Arkansas, are: Austin Corbin, W. G. Bosworth, F. W Watkins and G. S. Edgell, of New York; George Drew, of Sunnyside, Ark.; J. C. Connerly and Walter Davies, of Lake Village, Ark.; J. D. Deane and R. A. Pugh, of Portland, Ark.

Tennessee Coal, Iron & Railroad Co.—The annual meeting of the stockholders of the company was held at Tracy City, Tenn., March 16. The following directors were elected: C. C. Baldwin, J. H. Inman, James Swann, W. S. Guerno, Cord Meyers, James T. Woodward, W. S. Guerno, Jr, J. Edward Simmons, John G. Moore, A. B. Boardman, and J. J. McComb, of New York; N. Baxter, Jr, and A. M. Shook, of Nashville; John C. Haskell, of Bristol; David Roberts, of Birmingham; John Badger, Jr, and A. T. Smyth, of Charleston, S. C. The directors will meet in New York to elect officers.

Terminal Railroad Association of St. Louis.—The newly elected directors have elected officers as follows: President, Julius S. Walsh; Vice-President and General Manager, E. P. Bryan; Executive Committee, W. B. Doddridge, General Manager of the Missouri Pacific, Chairman; Joseph Ramsey, Jr., Vice-President and General Manager of the Wabash; W. W. Peabody, Vice-President and General Manager of the Baltimore & Ohio Southwestern; Treasurer, A. H. Calef, New York; Secretary and Assistant Treasurer at St. Louis, James Hanna.

West Shore.—Joseph B. Stewart has been appointed Superintendent of the Hudson River Divison of the West Shore, Superintendent of the Wallkill Valley road and Superintendent of the Jersey Junction road, in place of William G. Wattson, deceased. The appointment became effective on March 18. Mr. Stewart is now Superintendent of Telegraph and Signals.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Aberdeen & West End.—The extension of this road from Aberdeen to Troy, N. C., has been completed, and the first train to be operated between those points passed over the road last week.

Cassville, Harrison & Southeastern.—A certificate of incorporation has been issued in Missouri to this company to construct a road six miles in length from Cassville, the county seat of Barry County, to a point on the St Louis & San Francisco road, between the stations of Exeter and Butterfield. The incorporators are George A. Purdy, Frank Dodd and Washington Cloud, of Pierce City, Mo., and H. Ward Hicks and Robert Johnston, of Monett, Mo.

Chattanooga & Gulf.—Articles of incorporation of the company have been filed with the Secretary of State at Montgomery, Ala. The proposed route is from St. Marks, Fla., to Chattanooga, Tenn., via Columbia, Ozark, Union Springs and Tuskegee. The incorporators are Messrs. T. E. Rushing, T. Gardner Foster, S. B. Matthews, Gordon McDonald, A. T. Dreyspring, J. Gindrat Winter and A. B. Garland and associates. The capital stock is $100,000.

Chicago, Milwaukee & St. Paul.—This company expects to have 100 miles of second track in use by May 1. This will extend the second track now in use as far as Savannah, Ill., on the main line and give a continuous stretch of 100 miles of double track road from Elgin, which is a station about 37 miles out of Chicago.

Cincinnati, Lebanon & Northern.—It develops the the recent purchase of this road was made for the Middletown & Cincinnati Railroad, which operates a line north of Cincinnati from Middletown to Middletown Junction, O., 15 miles, crossing the Cincinnati, Lebanon & Northern at Hegeman, near its southern terminus. The road is controlled by Hon. Paul J. Sorg, a wealthy manufacturer of Cincinnati. It is presumed that the two roads will be used as a Cincinnati connection for the Cincinnati, Jackson & Mackinaw road. The southern terminus of the latter line is at present at Franklin, less than 10 miles north of the line of the Middletown & Cincinnati. As stated last week, this road affords a good entrance to Cincinnati and terminals in the city itself. It is stated that work on the extension from Middletown, or near that point, connecting with the Cincinnati, Jackson & Mackinaw at Franklin, will be commenced immediately.

Cleveland, Lorain & Wheeling.—A special meeting of the stockholders will be held in Cleveland on April 10, to vote upon the question of authorizing the issuance of $1,000,000 of general mortgage bonds to provide funds for the building of a second track, or loop around the Medina hills, near Cleveland (about nine miles in length) to relieve and shorten the main line and greatly reduce the grades for the through lake business; to build a branch 1½ miles in length to the Berea stone quarries; various extensions of sidings and coal branches; the purchase of additional equipment; improvement of car and machine shops; further needed improvements of the Lorain docks, and machinery for transferring coal from cars to vessels, etc. The circular announcing the meeting states that since the present management assumed control in March, 1893, the entire surplus earnings amounting to $600,000 have been spent for improvements.

Correctionville & Southern.—The right of way is being secured for this proposed road in Western Iowa, to be built from Correctionville, a small town located east of Sioux City at the crossing of the Chicago & Northwestern and the Illinois Central, south for about 30 miles The southern terminus is to be at Charter Oak on the Chicago, Milwaukee & St. Paul line to Sioux City. The surveys have not been made, but it is stated that a line will be run early in the spring. The project seems to have been brought up at this time by a court house contest between several Iowa towns which would get better connections with Sioux City and other important points by the building of this road.

Detroit & Cincinnati.—This company has recently filed a charter in Michigan but no details of the proposed route and nothing as to the company's plans are published. The incorporators are Edward R. Thomas, Henry L. Burnett, J. D. Thompson and others.

Elliston & Southern.—This company has been incorporated with a capital stock of $100,000, in Montana, by William B Edgar, W. H. Cameron, of Elliston, and George F. Cope, Cornelius Hedges and F. L. Sizer. The company is formed to construct a road from the Northern Pacific near Elliston, southeast of Helena, southerly by way of Mike Reining Gulch, the Ontario, Josephine and other mines in the vicinity, by way of Basin City, and by the most feasible route to the town of Gaylord.

El Paso & White Oaks.—Arrangements are being made to start the grading immediately on this road out of El Paso, Tex. The project is now in the hands of C. B. Eddy, formerly of Chicago. It is intended to build northwest from El Paso to White Oaks in the southern part of New Mexico, a line of about 100 miles. This first 20 miles from El Paso was completed some years ago. Contracts are now being made for the construction material.

Erie.—Important improvements are to be made in the roadway this year, some of which will be begun as soon as the weather will permit. One of the first improvements will be the reduction of the heavy grade at pine Valley, near Cleveland, on the Eastern Division of the road The estimated cost of this work is $150,000. The grade is about 50 ft. to the mile for a distance of two miles westward. A new right of way will be secured over the hill and the maximum grade will be reduced to 40 ft., with an average of only 20 ft. It is estimated that the trainload can be increased four or five cars, when the grade is reduced.

Florida & Cripple Creek.—Carlisle, Dittmer & Weitbree, well-known Colorado railroad contractors, have been awarded a contract for raising the present roadbed of this line about 20 ft. for nine miles, through Eight Mile Canon. Each summer, since the road was built in 1893, the roadbed in the canon has been entirely washed out by the heavy floods, and last year traffic on the entire road was interrupted for about six weeks, on account of the complete washing out of the track on this section. The work will be very heavy, and is practically side hill excavation in solid rock the entire distance. The funds for this work have been secured by an issue of bonds recently sold by President W. E. Johnson in England. It is said that the cost of the work will be close upon $500,000.

Gulf & Interstate.—After long delays the completion of this road to Beaumont, Tex., on the Sabine River, is finally reported, the last rails having been laid last week. This finishes the first 70 miles of road, giving a line from Point Bolivar on Galveston Bay opposite the city of Galveston northeast to the Sabine River at Beaumont.

Gulf, Colorado & Santa Fe.—This company is having a survey made from Antelope Gap, on its San Angelo branch, down to San Saba, in San Saba County, Texas, to reach the quarries of marble, lithographers' stone and potters' clay.

Jamestown & Lake Erie.—A contract for 400,000 yds. of grading on the four-mile extension south from Jamestown to a connection with the Dunkirk, Allegheny Valley and Pittsburgh, at Falconer, N. Y., will be awarded next week.

Kansas City & Northern Connecting.—The capital stock of this company was doubled at a meeting of the stockholders in Kansas City, Mo., last week, the authorized stock being now $2,000,000. The company was organized last June by directors of the Kansas City, Pittsburgh & Gulf road, which controls the existing Kansas City Suburban Belt road. We believe that no work has been done on this line since its incorporation, and we have not seen any definite description of the line which the company proposes to build. It is said that it is to provide additional terminals at Kansas City for the Kansas City, Pittsburgh & Gulf, and that it can also be used by the lines approaching Kansas City from the east.

Lehigh Valley.—It is said that this company may build to Oswego, N. Y., an important port on Lake Ontario. At present the company's chief port on the Great Lakes is at North Fair Haven. A railroad from that point to Oswego would be about 15 miles long.

Lima Northern.—W. B. Strang & Co., railroad contractors of 15 Wall street, New York City, will award sub-contracts for the grading on 45 miles of this road north of Napoleon, O., to Adrian, Mich., on April 1, at Lima, O.

Long Island.—The rails and other material to complete the tracklaying on the South Shore extension to Fort Pond Bay, the extreme easterly end of Long Island are now being assembled at the present end of the track. About 25 carloads of rails alone have been delivered at the present terminus at Amagansett. The road is built close to the southern shore of Long Island from this station to Fort Pond Bay or Montauk Point. The new road is about 20 miles long and is known as the Montauk extension of the Long Island.

Maine Shore Line.—Messrs. Mitchell & Westcott, of Portland, Me., who have the contract for building this road along the shore line of Washington County in Maine, are making preparations to resume grading by May 1 next. They hope to be able to complete the greater part of this work during the summer and possibly a good portion of the track-laying as well. At present seven miles of the road has been graded from Machias, Me., west, and the work this year will be carried on from this point. The road will be about 110 miles long altogether. It is being largely assisted by local subsidies, Washington County having subscribed $500,000 to its stock.

Mobile, Jackson & Kansas City.—The directors of this company are working actively to revive this project for a road from Mobile northwest to Jackson, Miss. The project is one of several years' standing, but very little actual work has been done beyond the grading of 20 miles of road on the southern end. Colonel F. B. Merrill, of Mobile, now President of the company, states that arrangements have been made in London and New York for funds to complete the road between Mobile and Jackson, if subscriptions of $250,000 to the capital stock are made in Alabama and Mississippi. The local directors are now addressing town meetings to secure the subscription, and it is stated that so far about $105,000 has been pledged.

Pecos Valley.—Chief Engineer Ballard is now running the final survey for the extension of the road from Roswell, N. Mex., to a junction with the Fort Worth & Denver City, near Washburn, Tex. He will locate the route as far as the Texas-New Mexico line as soon as possible. By the time the Texas line is reached the objective point will be settled upon. It is yet unsettled whether the junction will be at Washburn or Amarillo. The general officials say that construction will begin just as soon as the right of way can be secured.

Peoria & Pekin Union.—At the annual meeting last week the directors were authorized to build a second track on the entire road between Peoria and Pekin, Ill., a distance of about 10 miles. New shops are to be erected and other important improvements will be made. This road is chiefly a terminal line and furnishes terminals at Peoria for about 10 roads. It is owned by the Wabash, Lake Erie & Western, Chicago, Peoria & St. Louis, the Big Four and the Peoria, Decatur & Evansville.

Phillips & Rangeley.—The Redington Lumber Company will construct the northern extension, from the present terminus at Dead River north to Kennebago Lake, Me., a distance of 9¾ miles. In addition to opening up the extensive lumber tracts in the vicinity of Seven Ponds, the object for the construction of the road, it will be convenient for sportsmen visiting Kennebago. The distance from Kennebago to the mills of the company at Redington will be but 16 miles.

Puget Sound, Mt. Tacoma & Eastern.—This company was incorporated at Tacoma, Wash., last week, with a capital stock of $2,000,000, principally subscribed for by Eastern capitalists. The company proposes to take over a line of about 10 miles now built out of Tacoma,

known as Hart's logging railroad, and then build to Mt. Tacoma, about 40 miles distant from the city.

Queen Anne's.—The contract for the grading, bridge building and track-laying, on the second section from Denton, Md., to Ellendale, Del., has been awarded to Wade, Burns & Co., of Baltimore. The work is to begin at once and is to be completed by July. The track-laying on the first section, from Queenstown, on Chesapeake Bay, to Denton, 23 miles, is progressing rapidly. I. W. Troxel, Baltimore, is Chief Engineer.

Roanoke & Southern.—An extension of this road from Winston, its present southern terminus, to Charlotte, N. C., was discussed at a meeting of business men at Charlotte last week. It was stated that large town and county subscriptions to the capital stock could be easily secured for the road, and many of those at the meeting agreed to make large private subscriptions. The extension would give Winston a connection with the Seaboard Air Line. It is a large tobacco manufacturing town, shipping over 12,000,000 lbs. of tobacco a year, nearly all of which goes to southern points over the Southern Railway, which is now its only outlet to the South. The Seaboard Air Line would thus secure a connection with the Norfolk & Western at Roanoke, via the present Roanoke & Southern, whose northern terminus is at the latter city. The Roanoke & Southern now owns 124 miles of road, which has been leased to the Norfolk & Western for the last five years. The road itself was built in 1888 and 1889 principally by business men in Roanoke and Winston-Salem, aided by county subscriptions to the stock.

St. Louis, Mansfield & Ava Southern.—This company was organized at Mansfield, Mo., last week, with G. J. Roote, President; J. W. Singleton, Vice-President; F. E Adams, Secretary; J. D. Reynolds, Treasurer It is proposed to build from Ava, Douglas County, north to Mansfield, about 10 miles, and to a connection with the St. Louis & San Francisco, in Laclede County. The preliminary survey has been made.

St. Louis, Peoria & Northern.—This company, which is now operating the St. Louis & Eastern is having surveys made for extension from Springfield, north by way of Peoria to a point opposite Clinton, on the Mississippi River. At Clinton the line will form a junction with Burlington, Rock Island and other roads. There is a large market for coal at Clinton, which will come from the company's mines about Madison, near the lower end of the road.

Saratoga, Mount McGregor & Lake George.—This road has been purchased from the receiver by Charles D. Haines, of New York, who will at once extend it to Glens Falls and Lake George, N. Y.

Savannah, Florida & Western.—A short line is now being built near High Springs, Fla., to make a shorter connection between the Savannah, Florida & Western and the South Florida Division of the Plant Lines. At present the junction is made at the Santa Fe River. The new connection is a few miles south of that point.

Seaboard Air Line.—President Hoffman and Vice-President St. John spent part of last week at Asheville and Rutherfordton, N. C., which is the present western terminus of one of the divisions of this road. This trip lends new interest to the report that an extension west from the present terminus to Asheville, a distance of 42 miles, is being considered by the company's officers. Local reports state that the construction of the line may be undertaken this spring. We understand, however, that while such an extension has been considered by the officers, nothing definite has been decided upon in regard to building the line, and it is unlikely that the work will be undertaken at the time stated in the local reports.

Another extension in Western North Carolina, from Charlotte north to Concord, is also proposed. This, too, would give the Seaboard Air Line a road into a section of the state now reached only by the Southern Railway. The line, if built, would be 20 miles long.

Shelton & Southwestern.—This road, which is chiefly used at present as a logging line in the Puget Sound district of Washington, is to be extended about four miles to connect with the Gray's Harbor branch of the Northern Pacific. At present the company operates 10 miles of track. The extension will give the town of Shelton, on the west side of Puget Sound above Olympia, its only connection with the Northern Pacific. Two other lumber lines besides this road have been built out of the town, but heretofore it has had no through railroad connection.

Southern Pacific.—About five miles of additional second track is to be built by the company this summer on its main line through Louisiana. In 1895 about 25 miles of second track was completed between New Iberia and Franklin. The work now to be undertaken is a continuation of this second track east of Franklin to Sale Station, La., about 100 miles west of New Oleans.

Sunnyside & Western.—Articles of incorporation were filed in Arkansas last week by this company. It will build the railroad from the Mississippi River west through Arkansas, projected by Mr. Austin Corbin, to reach plantations owned by him, and now being opened for settlement. The road will be about 60 miles in length, commencing at a point on the Mississippi River on the Sunnyside plantation, running thence in a westerly direction to Portland in Ashley County, on the Missouri Pacific, thence west to Hamburg, the county seat of Ashley County. A branch extending in a westerly and northwesterly direction, will parallel the Mississippi River to a point opposite Van Cluse levee, thence northwesterly to a sawmill of the Sunnyside Company, on the south bank of Swan Pond.

Union Consolidated Elevated Co.—This is the title of a company organized in Chicago last week to build part of the proposed loop line for the elevated railroads in the city of Chicago. The chief incorporator is C. F. Yerkes, the street railroad capitalist of Chicago. The delay in building the elevated loop line has been caused by difficulty in securing right of way along Van Buren street east of the Chicago River. The opposition of the majority of the property holders on this street east of the river continues to make it practically impossible to secure a majority of the right of way, but Mr. Yerkes has within the last few weeks secured consents of property holders on Van Buren street, on the west side of the river, for building an elevated road, and this new company seems to have been incorporated to cover that portion of the street. The company claims to have now secured sufficient consents from property holders to assure the construction of the line on Van Buren street. The northern section of the road on Lake street is in operation as far as Wabash avenue. The foundations for the piers at the elevated structure on the latter avenue south of Lake street have been built, as well as on the western side of the loop, being Fifth avenue, south of Lake street, to Van Buren, which forms the fourth and south side.

Utah Midland.—This company is to be added to the many proposing to build from Utah to Southern California. It was organized in the former state recently to build through the mining district in Western Nevada, and to connect with the Carson & Colorado. The officers are James Glendinning, President; General W. H. Penrose, Vice-President; James Moffatt, Secretary and Treasurer, Major Edmund Wilkes, Chief Engineer, of Salt Lake City. The officers decline to give any definite information as to the company's plans.

Yosemite Valley & Merced River.—This company has just been organized by James B. Stetson, President of the San Francisco & North Pacific, John D. Spreckels and other influential men of San Francisco. The company proposes to build a road about 80 miles long from Merced over the Sierra Mountains to the Yosemite Valley reservation. The building of the road will save the long and tedious stage drive of 60 miles which is now necessary to reach the Yosemite Valley, but besides this the road will reach important mining districts and lumber lands. Of the capital stock of $1,500,000 the sum of $90,000 has been subscribed. Beginning at Merced the route of the line is northward to Snelling and thence eastward to Merced Falls. It then follows the Merced River canon the remainder of the distance to Yosemite Falls, reaching near Coulterville on this last section of the road, a very important mining district. The terminus will be at the reservation line about 1½ miles from the entrance of the valley and six miles from the principal hotel. The location of the road in the Merced canon will be so low that it is expected that there will be no interruption to traffic by snow blockades. The only tunnel on the line will be about 200 ft long, but the excavation work on the canon section will be side-hill work almost all the distance and quite heavy. The grades will also be heavy; reaching a maximum on the last six miles of the road of three per cent.

Electric Railroad Construction.

Albany, N. Y.—The State Railroad Commissioners granted this week to the Albany, Helderberg & Schoharie Electric Railway Co. the right to build its road from Albany to Schoharie, a distance of about 30 miles.

Amherstburg, Ont.—Application has been made to the government for a charter for an electric railroad from Amherstburg to Harrow, a distance of about 15 miles.

Chicago.—Articles of incorporation have been filed by the Chicago Midland Transit Co. It is proposed to build an electric railroad from Blue Island to Niles Centre; from Hammond, Ind., to Evanston, by way of Lemont, and from Twenty second street to Evanston, by way of Wheaton. The capital is $100,000, and among the incorporators are John E. Wilkie, Malcolm McDonald and F. T. Conklin, all of Chicago, where the offices will be located.

Denver, Col.—The West Creek Electric & Toll Road Co. has been incorporated by B. B. Clawson, A. O. Williams and Sidney Williams. It is proposed to connect the West Creek mining district with the steam railroads. The capital stock is $100,000

The Denver Consolidated Tramway Co., has been given a franchise to extend its Berkeley line to Golden, a suburb, about 10 miles west of Denver.

Elkton, Md.—The Cherry Hill, Elkton & Chesapeake City Electric Railway Co. has been organized by J. C. Price, T. Taylor Reynolds, Dr. Frank H Mackie and others to build an electric road between Cherry Hill and Chesapeake City. The road will be nine miles long and will carry both freight and passengers.

Hammond, Ind.—The Common Council has granted a franchise to the Chicago, Lake Shore & Eastern Railway Co giving a right of way 100 ft. wide over a route from the Illinois-Indiana state line to the eastern city limits, and from where the Chicago & Calumet Terminal crosses the Pittsburgh, Fort Wayne & Chicago to the Corning steel plant The company is required to provide a switch track from its main line to the city pumping station, and to haul cars over it free of charge. A franchise has also been given to the Calumet Electric Railway Co. for a right of way on 108th street from Indiana boulevard to the state line.

Harrisburg, Pa.—The Traction Co is securing rights of way for an extension of its lines to Rockville, five miles distant. The road will be along the Susquehanna River for most of the distance.

Johnstown, N. Y.—The Mountain Lake Electric Railroad Co. has been incorporated to build an electric railroad from Johnstown to Gloversville. The capital is $60,000. Charles King, of Johnstown; S. M. Foster, of Bleeker, and D. R. Bartlett, of Gloversville, are among the directors.

Long Branch, N. J.—The Long Branch, Red Bank & Atlantic Highlands Trolley Co. has made application for a franchise to extend its track on Shrewsbury avenue to Front street and down Front to Railroad avenue to the N. J. S. R. R. bridge. Other franchises for Red Bank streets are also asked.

New Orleans, La.—The Claiborne Street Railroad Co. will soon let the contract for rails for the road.

Norwalk, Conn.—The Norwalk Tramway Co. has been granted permission to extend its road from Norwalk through New Canaan. The road must be completed by Dec. 1, and the company must give a good faith bond of $10,000.

Portsmouth, Va.—The City Council has granted a franchise to the Port Norfolk Electric Railway Co. for a street railroad in Portsmouth. The company is to pay $20 a year for the use of each street, and $10 a year for each car for five years and $15 for each year thereafter.

About $60,000 has been subscribed towards building the Portsmouth Electric Street Railway, for which a franchise was granted some time ago. The company is given till May 1 to begin work. The two roads will not be built on any one street.

Quincy, Mass.—The Quincy & Boston Street Railway Co. have recently placed an order for about 10 miles of rails The company intends to rebuild the Neponset and Quincy Point routes. A 60-*ft.* rail will be used on the latter route.

Sandusky, O.—The County Commissioners have granted a right of way to the Sandusky Monroeville & Bellevue Electric Railway Co. Clark Rude, of Sandusky, and W. W. Graham, of Norwalk, are the promoters.

Shelburne Falls, Mass.—The Shelburne Falls & Colerain Street Railway Co. has been organized, with D. W. Temple, as President. The road will extend between the two towns, a distance of about five miles.

Springfield, Mass.—It is proposed to build an electric railroad from Springfield to Thompsonville, Conn., passing through the towns of Longmeadow and Enfield.

Tarrytown, N. Y.—The Tarrytown Electric Railway Co. will build an electric road, four miles long, from Tarrytown to Elmswood.

Winchester, Va.—The Frederick Electric Railway Co. has been incorporated, with a capital of $100,000, by H. H. Baker, G. W. Hadedox and others.

Winona, Minn.—The Winona Railway & Light Co. has been formed by F. B. Kellogg, C. A. Severance, of St. Paul, and M. B. Webber, of Winona, and others.

GENERAL RAILROAD NEWS

Baltimore & Ohio.—A second reorganization committee has been formed, being composed entirely of Baltimore interests and representing the large local interests in the securities, both bonds and stock It is said that there has already been deposited with the committee the securities held by the Johns Hopkins University, some of the Garrett holdings amounting to about 35,000 shares of stock, besides large holdings of bonds and securities held by many financial institutions at Baltimore. The committee argues that as a majority of the stock and a considerable amount of the bonds are held in Maryland, these securities ought to have representation in any committee formulating a reorganization of the property. It is estimated that the Baltimore committee now controls $40,000,000 of securities. Almost the entire issue of first and second preferred stocks is held in Baltimore, and it is estimated that fully 160,000 shares out of 250,000 shares of common stock, in addition to between $15,000,000 and $20,000,000 bonds, are also held in Maryland. Alexander Shaw, who was Chairman of the late Finance Committee of the company, is Chairman of the new committee, the other members being C. Morton Stewart, John Gill, John G. Harvey, T. Edward Hambleton, J. L. McLane and D. Fahnestock The main object of the committee will be to prevent foreclosure.

Belvidere Delaware.—An agreement of consolidation and merger between the Martin's Creek road of Pennsylvania and the Enterprise and Belvidere Delaware Creek companies, both being New Jersey corporations, has been filed at Harrisburg, Pa. The roads are controlled lines of the Pennsylvania, and are now consolidated into one company, called the Belvidere Delaware Railroad Company.

Grand Rapids & Indiana.—Judge Woods, of the United States District Court of Indianapolis, has issued a decree for the sale of this road under the second mortgage bonds, which amount to $3,734,765. The decree for the sale of the road has been anticipated since the announcement of the decision in the litigation between the various classes of bondholders, as reported in this column last week. Practically all the second mortgage bonds are held by the Pennsylvania Railroad. There is also a third mortgage, and these bondholders have been contesting the proceedings for foreclosure under the second mortgage.

Lehigh Valley.—This company has issued $1,500,000 of its consolidated mortgage 4½ per cent. bonds to replace the first mortgage 7 per cent. bonds of the Pennsylvania-New York Canal & Railroad Co., which fall due on June 1 next and are guaranteed principal and interest by the Lehigh Valley road.

London & North Western.—We have received a copy of the semi-annual report of the London and North Western for the six months ending Dec. 31, 1895. At the stockholders' meeting held Feb. 18, the Chairman called attention, among other things, to the convenience which passengers going to America by way of Liverpool now enjoy. When they have once paid their cab fare to Euston Station, London, they need not put their hands in their pockets again but can go straight down to the riverside station, which is a very convenient one, and embark at once in the easiest possible manner. This we suppose is an improvement in facilities which has been quickened by the excellent accommodations given to travelers by way of Southampton The Chairman believes that the result will be to retain, if not increase, the very large traffic going by way of Liverpool. He spoke also of the so-called racing to Aberdeen last summer, and renewed the assertion that there had been no racing, but that the London & North Western has simply gone on its way, determined not to lose a traffic which it was in some danger of losing. The company was averse to excessive speed or undue competition; but it has probably been a little too quiet. At any rate, the company determined to go boldly once for all and show that it was resolved to get its share of the traffic to the north. Reports from the Scotch traffic show that what has been done is of great pecuniary advantage to the company.

The income account for the half year, covering 1,912 miles, shows total receipts of £6,450,322. The receipts from passengers were £2,242,729; from freight, £2,067,461; from minerals, £1,212,759; from parcels, horses, carriages and dogs, £437,005 The working expenses were £3,437,581. Dividends at the rate of 7½ per cent. per annum were paid on the ordinary stock and at the rate of 4 per cent. per annum on guaranteed and preferred stock. The passengers carried during the half year were 38,648,551; the tons of freight were 19,202,009. The passenger train mileage was 11,683,408, and the mileage of freight and mineral trains 10,183,559. The percentage of working expenses to traffic earnings was 55.6.

Marietta & North Georgia.—The purchasers of this road at the foreclosure sale, Newman, Erb and others, defaulted on the second payment of the purchase money price, amounting to $150,000, which was due on March 9. The attorneys for the creditors have already applied to the United States Court at Knoxville asking for an order for the re-sale of the property.

New York, New Haven & Hartford.—After the directors' meeting last week President Clark made the following statement regarding the general policy of the road. "From July 1, 1895, to Feb. 1, 1896, the gross revenue of the road was $2,000,000 greater than for the corresponding seven months of the previous year. The operating expenses during this time increased nearly the same amount, but they include more than $1,000,000 of charges to offset depreciation In addition, $250,000 is to be charged to the interest account accrued on the original cost of the New England road's securities It is hoped that the four-tracking will be in use through Stamford by July 1. There still remains the Bridgeport problem, and how soon this is solved depends on the energy of the citizens. The improvements in Massachusetts on the Old Colony system are going on As to the new Union Station in Boston, there is no reason why the New Haven road should object to it if the Massachusetts Legislature orders it."

Northern Pacific.—The plan of reorganization of the Northern Pacific Railroad Co. was published simultaneously in New York, Philadelphia and Berlin on March 16. This plan was prepared by the Reorganization Committee, with the approval and co-operation of Messrs. J. P. Morgan & Co., Drexel & Co., and the Deutsche Bank, and these three banking houses have undertaken to act in carrying the plan into effect. The plan has received the approval of a majority of the bonds now in course of foreclosure. In order to carry out the reorganization both classes of the stock of the new company are to be vested in five voting trustees, namely, J. Pierpont Morgan, George Siemens, August Belmont, Johnstone Livingston and Charles Lanier, for five years, but at their discretion the trust may be dissolved at an earlier time.

The securities to be created are:

Prior lien, 100-year, 4 per cent gold bonds	$130,000,000
General lien, 150-year, 3 per cent. gold bonds	60,000,000
Preferred stock, non-cum lative, 4 per cent.	75,000,000
Common stock	80,000,000
Total	$345,000,000

The estimated present issue is:

Prior lien bonds	$96,577,000
General lien bonds	56,000,000
Preferred stock	72,500,000
Common stock	77,500,000
Total	$302,577,000

Of the Prior Lien bonds, $25,000,000, and of the General Lien, $4,000,000, are to be held for new construction betterments, equipment, etc., and the Prior Lien bonds are to be issued for this purpose at a rate not to exceed $1,500,000 a year. Of the preferred stock $2,500,000, and of the common $2,500,000 may be used for reorganization purposes, or may be held as a treasury asset for the new company.

The basis of exchange of existing bonds and of sale of new stock is as follows:

	Receive.				
	Cash.	New prior lien mortgage bonds.	New general lien mortgage bonds.	Preferred stock trust certificates.	Common stock trust certificates.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
General first mortgage bonds	*3	135	.....	.....	.....
General second mortgage bonds	†4	118½	.....	50	.....
General third mortgage bonds	†3	.....	118½	50	.....
Dividend certificates	†3	.....	118	50	.....
Consolidated mortgage bonds	†11½	.....	66¼	62½	.....
Collateral trust notes	†7	100	.....	20	.....
Northwest equipment stock	**100	.....	.....	.....	.....
Depositors of preferred stock — for payment of a sum equal to $10 per share	.....	.....	.....	50	50
Depositors of common stock—for payment of a sum equal to $15 per share	.....	.....	.....	.....	100

*Payable April 1, 1896. This represents the coupon due July 1, 1896.

†Payable 60 days after the plan shall have been declared operative.

‡Payable 3 per cent. on May 1, 1896; 4 per cent. on Jan. 1, 1897.

**Payable at any time, in the discretion of the Managers, on or before completion of reorganization, with interest at 6 per cent. per annum from June 1, 1896.

The Prior Lien bonds are to be secured by a mortgage upon all the property of the company. The General Lien bonds are secured by a second lien on the same property. It will be observed that the General Lien bonds to be created amount to $60,000,000. In addition a reserve will be created to provide for the Prior Lien bonds at their maturity in a hundred years. The preferred stock is to receive 4 per cent. dividends, but in any fiscal year in which 4 per cent. dividends shall have been declared on both common and preferred, all shares, whether common or preferred, will participate equally in any further dividends for such year. After the termination of the voting trust the preferred stock will have the right to elect a majority of the Board of Directors whenever for two successive quarterly periods, the full dividend is not paid in cash.

The general first mortgage bonds now outstanding are at the rate of $20,466 per mile. The new Prior Lien bonds will amount to about $22,310 per mile. The annual fixed charges for interest and sinking funds on the present general first and divisional mortgage bonds are $1,618 per mile. It is estimated that on the Prior Lien bonds they will amount to only $925 per mile. The net earnings of the Northern Pacific for the first five years show an average surplus over the fixed charges under the plan of about $1,809,000 a year, a sum sufficient to pay an annual dividend of about 2½ per cent. on the new preferred stock. This estimate includes the last two fiscal years when earnings fell to abnormally low figures. For the present year, notwithstanding great disadvantages, the earnings promise to amount to enough to pay 2 or 3 per cent. dividend on the new preferred stock.

A syndicate of $45,000,000 has been formed to provide the cash necessary to carry out the plan and to furnish the new company with a working capital and with a sum estimated at $5,000,000 for early use in betterment and enlargement of the property.

The receivers of the company report the following earnings for January:

	1896.	1895.	Inc. or Dec.
January:			
Gross earn	$1,163,922	$1,017,812	I. $146,110
Oper. exp	837,825	859,128	D. 21,303
Net earn	$326,097	$158,684	I. $167,413
Total income	$386,414	$25,917	I. $360,414
Int., rent and taxes	127,309	132,225	D. 4,916
Charges accrued	404,263	385,871	I. 18,392
Deficit	$145,158	$492,126	D. $346,968
Charges not assumed	425,215	442,226	D. 17,011
Total deficit	$570,373	$934,352	D. $363,979
July 1 to Jan. 31:			
Gross earn	$13,153,205	$11,353,429	I. $1,799,775
Net earn	$6,179,290	$4,341,378	I. $1,837,912
Other income	244,385	176,499	I. 67,886
Net income	$5,271,605	$3,385,352	I. $1,886,253

Nypano.—An agreement of consolidation between the Nypano Railroad Company of Ohio, and the Nypano Railroad Company of Pennsylvania, both recently incorporated, has been filed at Harrisburg, Pa. The new company will be known as the Nypano Railroad Company. Charles E. Whitehead, of New York, is President. The capital stock is $20,000,000.

Old Colony.—The Massachusetts Railroad Commissioners have authorized the railroad to issue $900,000 50-year five per cent. gold bonds, to fund the floating indebtedness incurred by improvements and construction. Last August the Railroad Commissioners authorized an issue of $600,000 bonds, but the company has never issued the bonds, and that was rescinded, and in place of it the present order, authorizing the issue of $900,000 of bonds, has been made.

St. Louis, Peoria & Northern.—This company, recently incorporated in Illinois, has taken over the property of the St. Louis & Eastern Railroad, the Madison Coal Co. and another small company. The St. Louis & Eastern a short time ago purchased the North & South Illinois Company, which was not taken over by the Chicago, Peoria & St. Louis when that company was reorganized. The road is to be extended to the Mississippi River.

Seattle, Lake Shore & Eastern.—The Great Northern has made an agreement with this company for the use of the latter's passenger terminals at Seattle, Wash. Under this contract the Great Northern passenger trains coming into Seattle over the Seattle & Northern, which is controlled by the Great Northern, will run into the passenger station of this company.

Electric Railroad News.

Boston, Mass.—The West End Street Railway Co. has let a contract to the Rice & Sargent Engine Co. of Providence, R. I., for two horizontal cross compound engines of 1,500 H. P. each for the new Dorchester electric power station. Each engine will have cylinders 26 in. and 50 in. diameter by 60 in. stroke, and will run 80 revolutions per minute. They will be direct connected with the generators.

Chicago.—The corporation counsel has been ordered to draft an ordinance requiring all overhead trolley wires in the city south of Fullerton avenue, east of Western avenue and north of Seventy-first street to be placed under ground within one year, and outside of the above limits within two years.

Kansas City, Mo.—The People's Cable Railway, built a few years ago at a cost of about $750,000, was sold at auction last week for $185,000, the upset price. J. H. Lucas, a local attorney purchaser, bid in the road in the interests, it is said, of its creditors.

Lima, O.—John N. Hutchinson has been appointed receiver of the Lima Electric Street Railway on application of Amos E. Townsend, the President. The property is mortgaged to the Metropolitan Trust Co. of New York.

Newburg, N. Y.—The Newburg Electric Railway Co. and the Orange Lake & Walden Electric Railway Co., have been consolidated under the title of the Newburg, Orange Lake & Walden Railway Co. The interest on the bonds of the Orange Lake & Walden Co. has been guaranteed by the Newburg Electric Co.

Pine Bluff, Ark.—The Citizens' Street Railway was sold last week at auction, and was bid in for $20,000 by A. C. Stewart, of St. Louis, Mo., for the bondholders, represented by the St. Louis Trust Co. The road is now operated by horses, but it is thought that electricity will be substituted.

Saratoga, N. Y.—Charles D. Haines, 100 Broadway, New York City, has been appointed receiver of the Union Electric Railway, which controls 10 miles of track in Saratoga.

Springfield, Mo.—The Springfield Traction Co. has ordered new trucks and motors for the cars in service on the belt line. The motors used on the belt line at present are 15 H. P. and the new ones will be 25 H. P.

Tacoma, Wash.—The Tacoma Railway & Motor Co. has asked the Street Committee for the right to transmit power for manufacting purposes to all parts of the city. This will probably not be granted, however, unless the company will give up its present right for lighting along its lines. The city is in the electric lighting business, and does not want competition. The Street Committee has given the company the right to carry freight.

TRAFFIC.

Traffic Notes.

The Washington correspondent of the New York *Journal of Commerce* concludes, from inquiries he has made, that there is no possibility of the passage of a bill in the present session of Congress to legalize the pooling of railroad earnings.

The passenger-rate war in Colorado broke out again last week, and, according to press reports, the Union Pacific, Denver & Gulf reduced the rates from Denver to points in southern Colorado about 70 per cent. The other roads promptly met the reductions.

The suit of the Government against the Joint Traffic Association, in the United States Circuit Court at New York City, has been again postponed, the date for the hearing being now set at March 27. Judge Jacob D. Cox, of Ohio, who was chosen one of the arbitrators of the Joint Traffic Association, has declined to serve on account of the pressure of other business.

The Delaware, Lackawanna & Western has reduced certain fares in consequence of the opening of trolley lines between Newark, N. J., and Bloomfield, Glen Ridge and Watsessing. Between the hours of 5:30 and 7 a. m. and 5 and 7 p. m. the fare for a round trip between these points on the Lackawanna will be 10 cents, the same as on the street cars. The tickets are sold in strips of 12, at 60 cents a strip.

New Orleans papers report that large numbers of Italian laborers are going from that city to New York by steamers. In former years this business has been taken by the railroads, and this year they have made a reduction in favor of the Italians, but it would seem that it is not large enough to capture them. The New Orleans reporters think that the existence of the new passenger association at that city, which has stiffened tariffs, explains why the reduction this year was not larger.

During the suspension of traffic on the Ohio River last summer on account of low water the coal operators of Alabama sold large quantities of their product in New Orleans and to the sugar plantations on the Mississippi River south of Greenville, Miss.; and now it is reported that these operators have made a traffic contract with the Southern Railway by which they hope to retain this trade. The amount of coal consumed annually in the markets referred to is said to be about 1,500,000 tons.

The New York, New Haven & Hartford has issued a revised tariff for the transportation of bicycles in baggage cars, reducing the minimum rate, which formerly was 25 cents. Now it is 15 cents where the fare is less than 40 cents, and 20 where the fare is between 39 and 75. An officer of the road states that last summer the baggage cars were frequently taxed to their capacity by reason of the bicycle traffic. Trains starting out of New York often carried as many as 35 wheels. The Long Island Railroad continues to carry bicycles free, provided the owner delivers and receives them at the baggage car door. This company consequently comes in just now for much praise from the associations of wheelmen who are trying to secure the passage of laws in New York, Massachusetts and other states compelling the railroads to carry bicycles for nothing.

The *Northwestern Lumberman* discusses at considerable length the movement of export grain to New Orleans and Galveston and sees, as a result, a bright future for Southern lumbermen. It says: Deep gulf ports will secure an outlet for the exportation of Southern lumber. The carrying of grain and other farm products southward will throw an immense number of cars annually into the South, which can be loaded back with lumber. The strife which is bound to arise between the railways for advantages in traffic will cause a reduction of rates, or an equalization of them, so that all parts of the yellow pine, cypress and hardwood producing fields can profitably share in the Northern trade. The building up of great commercial ports on the gulf, the expansion of manufacturing and the development of agriculture will cause an increase of population and enhance the demand for lumber. Thus a great future is certain for the Southern lumber business.

Chicago Traffic Matters.

CHICAGO, March 18, 1896.

After years of close relationship with scalpers the Chicago and Ohio River roads have resolved to cut loose from those undesirable allies. An agreement has been entered into which provides for the complete abolition of mileage exchange tickets. The exchange mileage tickets have been fruit for the brokers for years. By taking a mileage book into a railroad office they could exchange the same, or any part of it, for a straight ticket for an equal number of miles. This obviated the trouble of signing books and relieved the purchaser of any risk in not having the book honored. Those exchange mile-mileage tickets have been the chief source of revenue for a majority of Chicago scalpers, and have kept the passenger rates between Chicago and the Ohio River constantly demoralized. Conductors will be given strict oredrs to honor no mileage books except when the passenger identifies himself. The number of lines over which interchangeable mileage books will be received is also to be cut down.

The freight department of the old Central Traffic Association has been formally dissolved and what will be known as the Central Freight Committee has been formed in its place. The territory of the new committee will be about the same as that of the Central Passenger Committee and the committee will begin operations April 1, with J. F. Tucker, formerly Commissioner of the Chicago & Ohio River Traffic Association, as Chairman. The Illinois Central, Chicago & Eastern Illinois and the Cincinnati, Hamilton & Dayton are still without the fold of both committees. The latter line will probably become a party to both agreements. The Illinois Central claims that its peculiar location will not allow it to become a member of both Eastern and Western Associations. The C. & E. I. is holding out on account of the Illinois Central's position.

All of the Chicago and St. Paul lines have followed the lead of the Chicago Great Western in extending the return limit of tickets to the G. A. R. encampment at St. Paul next September from seven to thirty days. The last lines to give notices of independent action are the Chicago, Milwaukee & St. Paul, the Burlington, the Rock Island and the Northwestern.

The many recent fraudulent requests for exchange passes to officers of Western lines in Chicago has led Chairman Midgley, of the Western Passenger Agreement, to send a strong letter to all officers of Western roads urging them to require a strict identification of all applicants for exchange passes, and reasons for making the requests.

At a recent meeting of the Western Freight Association it was agreed to hereafter strictly maintain all grain rates from Missouri River and Iowa points to St. Louis and the Southwest, as well as to Chicago. These rates are still in a bad condition, but the trouble is not so serious as to threaten a dissolution of the Association, as has been reported.

Detectives of the Western Passenger Association report buying a good many tickets in the Denver market at from $2 to $5 below tariff rates.

At a joint meeting of the general passenger and general baggage agents of the Western roads it was agreed not to accept sewing machines, desks, etc., as baggage or any other packages not properly packed. The resolution limiting weight of single pieces of baggage to 250 lbs. 40 cu. ft. in size and not more than $100 in value was adopted.

Eastbound freight rates are the subject of much comment. Board of Trade shippers, who say they cannot get on the inside, allege that the Grand Trunk is shading the rates to New England, and that the Erie, in connection with the Norfolk & Western, is making big concessions on export traffic via Norfolk. Railroad officers say that the big business to Norfolk is accounted for by the fact that shippers are chartering a large number of tramp vessels to load at that port at very low ocean rates. No such condition exists at New York, so that the traffic is going via Norfolk and Newport News almost irrespective of the differential rail rates to those ports. Eastbound shipments last week amounted to 90,757 tons, compared with 87,563 tons for the previous week. The freight was divided as follows:

Road.	Week to Mar. 14. Tons.	Week to Mar. 7. Tons.
Michigan Central	9,338	9,493
Wabash	6,716	6,699
Lake Shore & Mich. South	9,818	11,459
Pitts., Ft. Wayne & Chicago	7,108	8,128
Pitts. Cin., Chi. & St. Louis	8,279	7,789
Baltimore & Ohio	6,439	6,289
Chicago & Grand Trunk	14,517	12,171
New York, Chic. & St. Louis	7,326	6,153
Erie	17,238	15,741
C., C., C. & St. Louis	3,978	3,650
Totals	90,757	87,563